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THE

MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—9TH YEAR. SYDNEY: SATURDAY, APRIL 29, 1922. No. 17.

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WORK OF THE MASSACHUSETTS-HALIFAX HEALTH COMMISSION.[1]

BY B. FRANKLIN ROYER, M.D., D.SC.,
Executive Officer, Halifax, Nova Scotia.

ON the sixth day of December, 1917, the *Mt. Blanc*, loaded with high explosives, collided with the *Imo* in Halifax Harbour, resulting in one of the greatest explosions of history. In the twinkling of an eye, two thousand homes were completely destroyed, many thousands of homes were seriously damaged, 1,635 persons were killed and thousands of others were crippled or injured. In large areas in the city of Halifax, in the town of Dartmouth and in several settlements adjacent to each practically all residences were completely knocked down and in some instances such remains as were left standing were destroyed by fire. The concussion from this explosion was so tremendous that it was definitely felt at points sixty miles away and in one instance was even reported one hundred and twenty miles away.

Early Relief Work.

On the very day of this terrible disaster, within a few hours after the explosion occurred, the good people of Massachusetts sprang to the assistance of the stricken community. Relief trains, fully equipped with supplies, doctors and nurses, were rushed to Halifax and were on the way hours before telephone and telegraph communication had been re-established.

Later on a Massachusetts-Halifax Relief Committee was organized, consisting of the following members: Henry B. Endicott (Chairman), James J. Phelan (Vice-Chairman), Matthew Luce (Secretary), Robert Winsor (Treasurer), James J. Storrow, A. C. Ratschesky, Joseph B. Russell, Robert F. Herrick, W. Murray Crane, George H. Lyman, Mrs. Nathaniel Thayer, John F. O'Connell, B. Preston Clark, J. Frank O'Hare, Charles S. Baxter, Edwin U. Curtis, George C. Lee, Walter C. Baylies, James Jackson.

Three-quarters of a million dollars were raised for continuing the emergency relief. A local committee in Halifax was designated to distribute the supplies and moneys contributed, the Halifax Committee being as follows: G. Fred Pearson (Chairman), A. D. McRae (Secretary), Mrs. G. S. Campbell, Mrs. J. Norwood Duffus, H. R. Silver, R. T. MacIlreith, W. R. Powell. This local committee's work has received only the highest praise from citizens of the community.

[1] This article has been written in response to a direct invitation from THE MEDICAL JOURNAL OF AUSTRALIA. It was subsequently read before the Section on Public Health Administration at the meeting of the American Public Health Association, New York City, on November 14, 1921, and will appear in due course in the official journal of that Association.

The Five Years' Health Programme.

After the period of emergency relief had passed and the Dominion Government had organized its relief commission on a basis of unprecedented magnanimity, there remained unexpended in the hands of the Boston Committee approximately $250,000. Before determining what should be done with this large balance, the Boston Committee consulted with their local representatives in Halifax and finally decided to have a complete study of conditions and needs made by a neutral person. Dr. Victor G. Heiser, Director for the East of the International Health Board, was fortunately secured and during the summer of 1918 he reviewed the health conditions and needs as he found them following the explosion and from available statistics for a period of seven years prior to the disaster. On his recommendation the Boston Committee determined that the unexpended balance might best be utilized, if agreeable locally, in an endeavour to improve public health conditions in the city of Halifax and in the town of Dartmouth.

Gottingen Street Entrance to Health Centre No. 1.

Dr. Heiser pointed out specifically that, because of over-crowded conditions, certain to obtain during the years required for restoration and rebuilding and during the years of rehabilitation, much greater public health effort would be required than formerly to prevent death-rates from rising. Feeling that the time was opportune for inaugurating an advanced public health programme, it was recommended to the Boston Committee that this money be expended in a public health and preventive medicine campaign to extend over a period of five years; in order that the demonstration might be complete and satisfactory, the recommendation provided for endorsement by the Provincial and City Government in advance and that each should make substantial contributions—$5,000 annually in the way of funds or facilities—for carrying out the programme. It was also recommended as advisable that the Halifax Relief Commission, an organization doing splendid work as the Government's agent in settling claims, rebuilding and rehabilitating the community, should provide a sum of $15,000 annually for five years, with the understanding that certain of the terminal medical and social work in connexion with rehabilitation be done by the new organization. These sums would provide $75,000 a year for a population of a little less than 75,000.

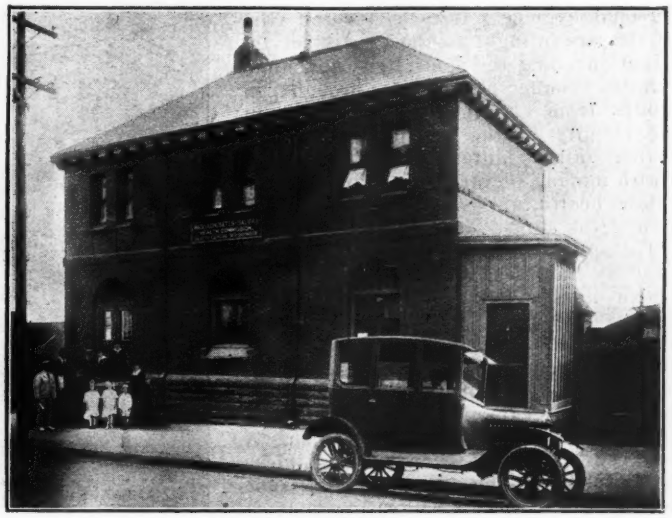
Old Admiralty House, Halifax, Nova Scotia.
In this building the Admiral of the Imperial Fleet, up until fifteen years ago, lived in summer and held many entertainments. This building is now Health Centre No. 1 in Halifax, having been loaned to the Massachusetts-Halifax Health Commission for this purpose by the Department of Naval Affairs, Ottawa.

Dr. Heiser's recommendations were agreeable to the Boston Committee, as well as to the Halifax Relief Commission and the Provincial and City Departments of Health, and had the advance endorsation of His Worship the Mayor, the Board of Control of Halifax, the Board of Trade, Commercial Club, Rotary Club, Halifax Medical Association, Halifax Anti-Tuberculosis League, Victorian Order of Nurses and the City Board of Health. A great deal of time was consumed in securing the approval of the agencies concerned. All finally agreeing, it was considered advisable to have a special commission created to carry out the public health programme recommended. It was not until the latter part of May, 1919, that an enabling Act of Provincial Legislature was passed, making possible the organization now known as the Massachusetts-Halifax Health Commission.

The various members of the Commission were appointed during the summer of 1919. The Commissioners met for

organization on September 22 and for conference with social and welfare agency representatives of the community on September 25. The personnel of the Commission is as follows: G. Fred Pearson (Chairman), Honourable R. G. Beazley (Vice-Chairman), H. R. Silver, Judge W. B. Wallace, Dr. W. H. Hattie, Dr. H. A. Payzant, J. L. Heatherington, Mr. Justice Rogers, Dr. J. L. Churchill. The present executive officer was secured on October 1, 1919, and the public health and preventive medicine campaign was launched as rapidly as possible during the latter part of 1919.

Dr. Heiser's constructive recommendations provided for an executive officer, public health nurses, a broad gauge public health educational campaign, modern supervision and treatment of milk and water supplies, modern sanitation in every particular.

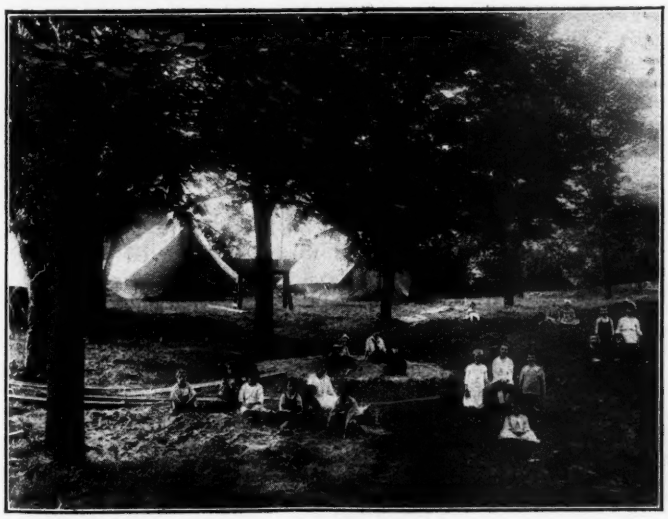


Health Centre No. 2, Dartmouth.
This Centre serves a population of approximately eight thousand. The sedan car is the property of the Commission.

The Organization of Health Centres.

In carrying out the Heiser recommendations, difficulties arose in securing buildings that might be adapted suitably for health centre purposes in the city of Halifax and town of Dartmouth. Through the good offices of the Department of Naval Affairs, old Admiralty House, a commodious stone structure with large lawns and garden, erected originally by the British Navy in the early part of last century for the purpose of residence and of entertainment of the Admiral when the Imperial Fleet was in Halifax Harbour, was released for health centre purposes. The building had been renovated and freshly equipped for use during the war as a naval hospital and lent itself splendidly to the community's needs. It was one of the few buildings to escape in the devastated area. Admiralty House was made Health Centre No. 1. In it was organized, as rapidly as staff could be secured, pre-natal, child welfare, pre-school age and school age advisory and operative ear, nose and throat services, pre-school age dental clinics, nutrition and posture classes, advisory and diagnostic tuberculosis services, a special psychopathic clinic for the explosion victims and under the local Provincial Government clinics for the treatment of venereal and skin diseases.

Each of these services are covered by public health nurses for the purpose of getting in touch with families and making instructive visits to the homes of those patronizing the clinics. Public health education is the prime thought in all services, both in the Health Centre and in the home. A pre-school age dental service stands out with particular prominence and is the newest line of public health endeavour. An attempt is being made to feature preventive dentistry in the pre-natal clinic, as well as during the pre-school age period up to the age of six. Proper nourishment of teeth is impressed quite as much as prophylactic treatment and right oral health habits. The nutrition and posture clinics are conducted as far as possible by classes and so co-ordinated with the ear, nose, throat and chest services that complete examinations, together with removal of handicaps as needed, make these services doubly attractive and doubly useful.



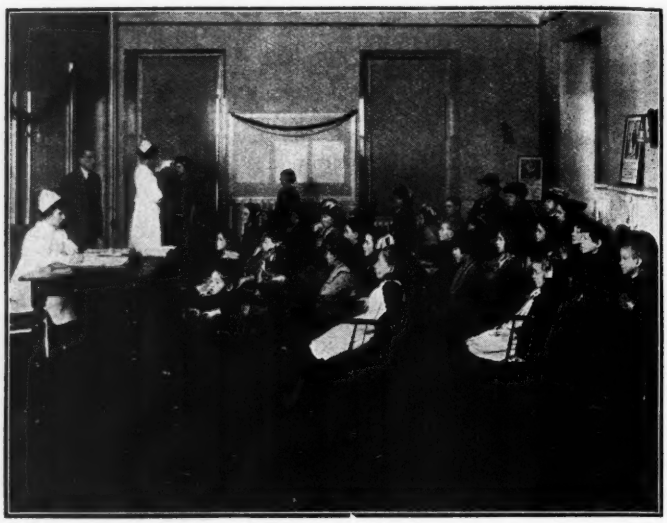
A Part of the Open-Air Day Camp.
Under-nourished children in contact with tuberculosis were maintained on the Health Centre grounds during the summer of 1921 by the Halifax Anti-Tuberculosis League.

In Health Centre No. 1 rooms are set aside for class teaching along hygienic and sanitary educational lines and a certain amount of miscellaneous community education is undertaken as well. With the co-operation of St. John Ambulance first-aid classes are conducted in the Centre, finishing with special lessons on

personal hygiene. Boy Scouts and Girl Guides are brought to the Centre for instruction along the same lines and numbers of young people are brought in groups from churches and factories in the vicinity to the teaching rooms for health talks, lantern lectures, public health moving pictures, etc., given by the public health nurses and various members of the staff.

The splendid garden on the grounds is used by families found by the public health nurses living in lofts or slum lodgings where no ground is available. The families (thirty) are encouraged and taught to cultivate and grow vegetables suited to the particular family needs, thus acquiring health, education and a desire for a home with garden. A day camp for under-nourished children is conducted on the grounds during summer by the Anti-Tuberculosis League.

Plans are now being made for organizing classes in cookery in the Health Centre for young women in the neighbourhood, who marry without sufficient training in supplying a family with food necessities and without knowledge of budgeting.



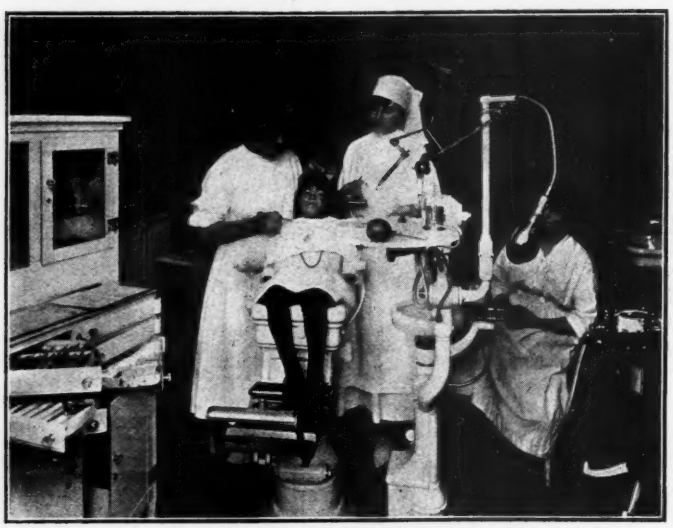
The Nutrition Class.
This class meets every Saturday afternoon, under the supervision of Dr. F. W. Tidmarsh, public health nurses and visiting housekeeper.

As soon as this first health centre was fairly well organized, a second building was secured for health centre purposes in the town of Dartmouth. In this instance, the building had been out-grown as a Government post office. Centrally located, electric lighted and hot water heated, when the first floor and five small rooms were renovated it was almost ideal for a health centre in a town of eight thousand. Here, tuberculosis, child welfare, eye, ear, nose and throat clinics and nutrition classes are organized and the same sort of community teaching, with the exception of gardening, is being carried on in well-appointed rooms. Here the Victorian Order of Nurses, the "I.O.D.E.," the "King's Daughters" and the "G.W.V.A." meet and co-operate with the staff.

Nursing Service.

In the beginning of this work the call elsewhere was so great that it was almost impossible to secure suitably trained public health nurses. The Commission's executive officer fortunately having been called in consultation by the Red Cross Society of the Province, advised the Society to join the Commission's forces and Dalhousie University for the purpose of training locally those nurses who are essential to public health teaching in any community. These organizations agreed and were joined by the Halifax Welfare Bureau, the Victorian Order of Nurses and various charitable and philanthropic societies. By September, 1920, a class of nurses completing a six months' course was made available to the community suitably trained for home teaching and health centre work.

The educational publicity and general educational work are directed from the central offices by the executive officer. Newspaper interviews, pamphlet publications, illustrated lectures and talks before clubs, churches and women's organizations of every sort and kind have been resorted to. Some "outfield" work having a more or less direct influence on the local educational campaign is conducted by accepting invitations to lecture at various points in the Province, always giving opportunity for reports to reach the local community through the press. The Commission staff co-operated with the Red Cross in promoting the health caravan



Dr. Arabelle Mackenzie's Pre-School Age Dental Clinic.
So far as known, this is the second strictly pre-school age dental clinic in the world, the first being organized in Cleveland, Ohio, while supplies were awaited in Halifax. No children are taken over six years of age.

last year, helping with the publicity and speaking, and helped to plan their triumphal return.

In May, 1920, a trained public health nurse with years of experience in organization work was engaged to assist the executive officer and to direct the nursing end of the work.

A full-time tuberculosis expert was secured in June, 1920, to work along plans very much like those at Framingham, namely, to have general charge of all tuberculosis clinics and to serve as consultant to the community, seeing patients with physicians in private practice before they become necessitous.

A series of advisory clinics were organized in the Health Centre during the summer and autumn of 1920. The doctors were appointed to serve without salary, each, however, to be given research study allowance at the end of any twelve month period.

In order that the physicians of the community might be given greater diagnostic laboratory advantages and that the various health centre clinics might have the advantage of scientific investigation and check, permission was obtained from the Provincial Government to place a full-time pathologist - bacteriologist with technician in the Provincial laboratory. These places were filled in June, 1921, and the scientific services are being greatly appreciated by physicians and by the public.

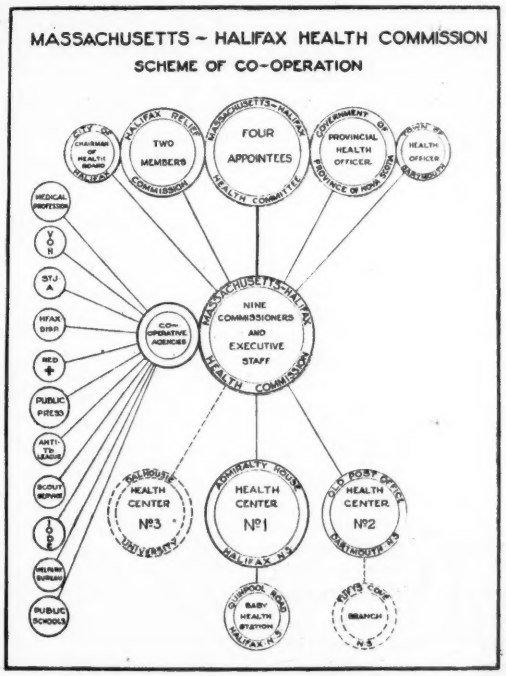
With the opening of the various clinics and publication of monthly reports, the work of the Commission began to be more and more appreciated by the community. Within seventeen months of the opening of these clinics in Health Centre No. 1, more than one thousand families came under the supervision of this health centre for medical advice and half as many more came under nursing supervision in the district. A proportionately large number of families came under the supervision of the second health centre after its opening in March, 1921.

At the present time (November, 1921) quite 2,000 families are under the medical and nursing supervision of the two health centres. Fourteen physicians (three of them full-time) and one dentist of Halifax and Dartmouth are associated with the Commission's various health centre services, a chief nurse, twelve public health nurses and one visiting housekeeper are employed. Two special nurses and two health centre secretaries are also employed. With but two exceptions all are Canadians.

The work of the first health centre, when reviewed by representatives of the International Health Board of the Rockefeller Foundation, influenced them to "earmark" $200,000 for building a Dalhousie health centre for the south end of Halifax. This new health centre is being planned for the University as an integral teaching unit of the medical school and will serve as an out-patient department to the group of hospitals now in the immediate vicinity of the Medical School. With health centre service for the southern half of Halifax conducted by the medical faculty from a University building, staffed with public health nurses, students of medicine will be given great clinical opportunities and will here for the first time be given ample opportunity to study domiciliary causes of diseases and a chance to acquire a proper fundamental groundwork for preventive medicine.

The Details of the Organization.

The general scheme of organization and the general plan of operation may perhaps be set forth best diagrammatically (see diagram). It may be described about as follows:



The Commission consists of nine men, three of them by virtue of their offices being members—the Provincial Health Officer, the Chairman of the Halifax City Health Board, the Health Officer of the Town of Dartmouth—two being appointed by the Halifax Relief Commission and four by the Massachusetts-Halifax Relief Committee of Boston. The Commission acts under a special Provincial law and meets semi-monthly. Policies are determined by the Commission and work directed through the executive officer and staff. The Provincial and local health authorities are members of the Commission for the purpose of co-ordinating the established work of each with the new work undertaken by the Commission. It is the aim and object of the Commission to do such lines of health work as should properly come under the local health officials in each community and to work in the closest co-operation with all privately endowed philanthropic and charitable agencies, so that overlapping may be reduced to a minimum and waste avoided.

The public health nursing programme is wholly constructive in character and is a very large feature of the work. Each nurse is responsible for the entire public health programme in the district assigned her and for the health of every member of each family with whom she comes in contact. She seeks to remove as far as possible domiciliary causes of disease and to train and re-educate the family in right methods of living. In emergency only or for family demonstration is bedside nursing done. The

Victorian Order of Nurses do the routine bedside work in homes and give general family instruction during such intervals.

The health nurse's work is supplemented by instruction in the home, given by a visiting housekeeper, where families co-operate and nutrition problems are paramount.

The public water supplies only require protection of sheds and germicidal treatment of water. This is wholly work for the established health authorities and engineers. Some means of protection of water sheds have been provided for in both communities by posting warning notices and in Dartmouth by fencing. Halifax is treating the water supply with chlorinated lime. Dartmouth will be obliged to do so. The Commission's laboratory staff studies samples of water frequently for the purpose of watching bacterial content, reporting all findings to local health officials.

The milk supply is not well handled. In Halifax a start has been made by employing a full-time veterinary inspector and by promulgating regulations covering farm production, shipping and retailing, with bottling and can sterilization to be enforced in May, 1922. Dartmouth has done nothing as yet. Both communities are remote from production and draw their supplies to a very large extent from poorly equipped dairies. Further, because of slow railway and retail deliveries, their milk problems are comparable to those of large cities.

Pasteurization will have to come for safety. Efforts are being made to create a public opinion that will demand pasteurization. Unfortunately, a good deal of backward education has to be overcome, notwithstanding the fact that 30% of the milk and 90% of the cream in Halifax is now being pasteurized, a number of physicians and one scientific worker until recently opposed pasteurization. It may require another year to overcome this influence.

Halifax has recently opened a fifty-bed tuberculosis hospital, where advanced patients will be admitted for special care, the Commission's expert and laboratory staff and Dalhousie's teachers being available in this service. A preventorium is needed. Preparatory educational steps are being taken.

Great improvement in sanitation is coming about with the rebuilding programme of the Halifax Relief Commission, the Dominion Government organization, which is represented on the Massachusetts-Halifax Health Commission, and with the street building and sidewalk programme of the two communities.

It is the ultimate hope of the Commission that toward the end of a five-year period such striking public health result will be shown that Halifax and Dartmouth will be eager and willing to plan for furtherance of the work and that, before the end of the period for which money is now available, each will begin financing the work more liberally and that each will plan to take over every activity proven to be valuable in lessening sick rates and saving life. It is hoped that the death rates obtaining when the work was begun, an average general death rate above 20 per 1,000 and an infant rate above 180 per 1,000 for a period of ten years for Halifax, will be dropped to 13.5 and 100 respectively or less by the end of the first quinquennial period and in Dartmouth to 13 and 100 respectively or less in the same time. It will be the aim of the Commission to make public health education, the prevention of disease and saving of life give sufficient impetus to preventive medicine in these communities that abundant funds will be readily forthcoming for continuing the work in the future and also to set a splendid public health example on the north-eastern part of the American continent.

THE POSSIBILITIES OF IRRADIATION IN MALIGNANT DISEASE.[1]

BY L. J. CLENDINNEN, M.B., B.S.,
Honorary Radiologist, Melbourne Hospital.

IN accepting the invitation to read this paper, what I understood was desired was a brief *résumé* of radio-therapy of malignant disease, its limitations and its possibilities in the near future. I have avoided as far as possible details of merely technical interest and have endeavoured to condense the views of authorities in the physical, histological and clinical sides of the question.

Physics.

Let me first of all very briefly acquaint you with the physical side of radiation as it is known.

Radium.

The rays given out by radium are of three kinds: α rays, which can be disregarded as having no therapeutic function, β rays and γ rays. These last two types have therapeutic value. The β rays, which are identical with cathode rays produced in an X-ray tube, vary, as do X-rays, in their wave length and so in their penetrative power, which is inversely proportional to their wave length. They consist of negative electrons projected with a velocity of the same order as light waves, but with a considerably smaller wave length. Their wave lengths are measured in ten-millionths of a millimetre, whilst those of light are measured in thousands of a millimetre. Their proportion to an inch is that of an inch to the earth's radius. The X-ray spectrum covers many octaves of wave length. According to their penetrative power, β rays are classified into (*a*) soft, which cannot pass through 0.2 millimetre thickness of aluminium, (*b*) medium, which are stopped by 0.2 millimetre thickness of silver, and (*c*) hard, which penetrate 0.2 millimetre thickness of silver.

The γ rays, which are present in the proportion of 10% of the total β rays, represent the limit of penetrative power. Radium when first used was unfiltered and the dose was limited by the tolerance of the skin, which absorbs a great portion of the more numerous soft rays. This necessitated short exposures of an hour or so or even less and the small dose of hard rays stimulated rather than otherwise growth cells at any depth. The β rays, for instance, at a depth of one centimetre, are reduced to 6% of their initial value. With filtration of

[1] Read at a meeting of the Victorian Branch of the British Medical Association on March 1, 1922.

one millimetre of lead, by which is cut out 99% of β rays, γ rays being unchecked, the same amount of radium can be exposed for one hundred times as long a time to the same skin with no more reaction, while deep-seated growth cells receive a dose one hundred times greater. This was a great advance in radium therapy many years ago now.

X-Rays.

In X-rays also the rays vary considerably in wave length or penetrative power from soft to hard. The soft rays are very analagous in wave length and tissue action to radium β rays, while the harder rays approach the penetration of γ rays, the most penetrating X-rays being calculated to be of three times greater wave length and so one-third the penetration of γ rays. While an X-ray tube discharge is known to be a shower of rays of varying wave lengths, these, as a whole, are proportional to the high tension voltage energizing the tube. Just as with radium, naked unfiltered rays were at first used in therapy; later on improvement in results was experienced with increasing voltage and filtration, whereby the softer rays were cut out and a larger dose administered without increasing the skin reaction. Experimentation was restricted in this respect by the limitation of voltage-carrying capacity of the tubes to about 110,000 volts or a twenty-five-centimetre (ten-inch) spark gap between points with which the maximum practicable filtration was about eight millimetres of aluminium.

For the past few years the Germans, amongst others Wintz and Seitz, at Erlangen, and Dessauer, of Frankfurt, have been working with further increased voltages and filtration and have provided rays considerably nearer a homogeneity and a radiation approaching the filtered radium ray. The practical results bear out what would be theoretically expected. The voltages, probably peak voltages, recorded are about 200,000 volts and this limit has been imposed by the carrying capacity of their tubes. These instruments, when tested in America, recorded nearer a 32.5-centimetre (13-inch) spark gap. This work has stimulated physicists in America and now several well-known and reputable firms are building units guaranteed to give a fifty-centimetre (twenty-inch) spark gap equivalent, while Coolidge has produced a tube to stand up to this voltage. The Germans have also very thoroughly worked out the radiation at varying depths with different filters, different size ports of entry and also the lethal dose for varying types of cancer. Various phenomena, hitherto unknown, have been discovered, mostly by the aid of an instrument called the iontoquintometer, which is a very small ionization chamber, about the size of a small thimble, that can be inserted into body cavities and connected by a flexible cord to an electroscope outside. In this way the actual dose administered at a depth can be accurately determined. It is so found that the radium intensity at a point in the centre of a radiation field is by 30% to 60% greater than at points in the sides of the field at the same depth. It is also found that secondary radiations, produced in the tissues themselves, are a big factor in these readings. For instance, the primary radiation energy from a tube fifty centimetres (twenty inches) from the skin, filtered through one millimetre of copper (which equals about eighteen millimetres of aluminium) is reduced to 10% at a depth of ten centimetres, though in reality the secondary radiation increases this to 44%.

Other contrivances have been devised to measure accurately the dose given. One is a graph of the luminous fluctuations between the points of an oscilloscope connected in series with the tube; this is a record of the behaviour of the tube. Another such control making for accuracy in radiography, as well as in therapy, is a stabilizer, which, when set for a certain amount of current (that is *milliampères*) to pass through the tube, keeps this factor absolutely constant.

Action of Radiation on Living Tissue.

It has been proven over and over again that rays have both a "differential" and a "selective" action. A cell behaves differently according to the type of rays to which it is subjected, while the same type of rays has what is generally referred to as a "selective" action, that is, it has a greater effect on some cells than on others.

The differential action can be exemplified by the action on the skin of unscreened radium rays or of soft X-rays of long wave length. The same skin will stand very many times the dose of filtered radium rays or of filtered hard X-rays of short wave length and, moreover, the results are very different.

The selective action of rays extends from in the lowest forms of vegetable and animal life to the most complex tissues.

Studies on protozoa reveal a wide variation of response of these organisms to the same exposure. Multi-nuclear and larger forms are more sensitive. In the body the testicle and lymphoid tissue are notable examples of a high degree of sensitiveness, while nerve tissue and eye structures are the most resistant.

This selective action extends to the structural differences of the cells. Lymphocytes of a leuchæmia are rapidly destroyed by these rays, while those of an inflammatory leucocytosis are not affected. Similarly, a lympho-sarcomatous gland responds in a much more marked degree than a tuberculous gland. Furthermore, it is believed that a particular type of cell varies in its reaction to the same type and intensity of radiation according to the phase of its life cycle at the time of its radiation. Certain ova have been found to be eight times as sensitive when in an active stage of division, as when in the resting stage.

It is a well-established fact that the effect of radiation on living cells, if of sufficient intensity and if allowed to act for a sufficient time, is manifested in three distinct phases: (*i.*) Increase of cell activity, with possible associated proliferation, (*ii.*) arrest of cell activity, (*iii.*) degeneration and destruction of cell. A normal tissue cell may be stimulated to proliferation by the same dose which will destroy a pathological cell at the same depth.

Cancer cells, being of an embryonic type, are ray-sensitive and these can be influenced by radiation without any apparent changes to the surrounding adult cells.

On this fact radio-therapy is based. While success depends on the correct dosage and application, it can readily be seen that pathological cells may easily be stimulated by insufficient dosage or faulty technique.

Microscopical Changes in Cancer Cells After Radiation.

These changes vary considerably with the different type of cell and the part in which it is located. The destructive action may be direct or indirect. If direct, in the case of those cells receiving a large dose, the histological changes may appear in twenty-four hours, first of all in the nucleus in the form of irregularity or fragmentation, followed by œdema and penetration of lymphocytes into cancer nests; these blood cells may adapt themselves to phagocytosis on a large scale, by fusing to form giant cells, polymorpho-nuclear cells sometimes assisting in the process of demolition.

In indirect destruction the slower death of the cell is preceded by (*i.*) hypertrophy of cell-body and nucleus, (*ii.*) nuclear budding, (*iii.*) increase in size and number of pseudo-parasitic bodies. In addition, squamous-cell-carcinoma exhibits keratinization. In the majority of cases these cellular changes are accompanied by a round-celled infiltration, the result of the stimulating action on the normal tissues. These cells fibrillate and subsequently change into dense, sclerotic, avascular tissue. This tissue limits the growth mass and gradually strangles and starves the unkilled but wounded peripheral cancer cells.

Again, in other types of growth (fibro-sarcoma and myeloid) a definite transformation to a benign fibroma has been found after irradiation. Progressive atrophy of cells occurs with increased fibrous tissue, with diminution of calibre of blood vessels and with a resulting regular cicatrical plaque.

It is very probable that when a growth is exposed to the influence of these rays the actual cells undergoing mitosis are the most sensitive. This reasonable conclusion has led many radiologists to prefer to aim at a fractional destruction from repeated deep radiations. At the same time, there is abundant evidence that repeated radiations produce a gradual loss of sensitiveness of the growth cells and, although inhibition and retardation of the growth are observed, the total destruction of the growth and cure of the disease are not accomplished.

In general the clinical and laboratory experience is that a massive destructive effect by radiation is necessary for a cure. This is what the Germans have lately advocated and, although attended by some risk and considerable suffering, reaction in cases of deep-seated growth, the results seem to justify it. The lethal dose of radiation has been found by them to vary in different types of malignant disease, from 60% to 70% of an erythema dose in sarcoma and to 110% in carcinoma. It can therefore be seen that a lethal dose in a deep-seated carcinoma is impossible through one port of entry. How can we make use of these changes in therapy?

Pre-Operative Radiation.

Consider a breast case, so-called operable, with a small axillary gland that is operated on without preliminary radiation! The most careful and skilful surgeon can only determine macroscopic growth, while lymphatic ramifications cannot be eradicated. Cells so split at operation are carried away by open lymphatics or the blood and disseminated, whilst in scirrhous types Nature's limiting barriers of fibrosis are destroyed and a recurrence means a considerably more rapid growth. It is no wonder that a patient who has involved axillary glands, has at the best one chance in five of living five years (Russell Boggs), while one authority, Dr. Douglas Quick, states from the most reliable surgical statistics that only 4% of the patients survive for eight years.

Now consider a tumour that has been efficiently subjected to irradiation prior to operation, by which is understood rays of sufficient intensity are applied over the whole area of the lymphatic spread! The cells not absolutely destroyed, that is, the deeper ones and more outlying ones, those perhaps most liable to be split or left behind, have become weakened and are sterilized, losing their power to reproduce themselves, either locally or when transplanted. This is proved experimentally in animals; cells that have been sufficiently exposed to β-, γ- or X-rays cannot be grafted into fresh tracts. At the same time the lymphatics are definitely restricted in lumen. Other changes, which, however, do not take place for three or four weeks, are connective tissue development with obliteration of blood channels or diminution of their lumen, with characteristics of capillaries with flattened and elongated endothelium. This fibrosis and avascularity acts as a barrier to further spread. By applying the cross-fire method from various aspects the barrier can be often induced to surround the growth. This very important pre-operative part of radio-therapy cannot be too strongly advocated, for once cells are scattered throughout the body, although local recurrences may be retarded and even made to disappear, far-distant metastases are uninfluenced and carry off the patient in a heart-breaking way. Incidental to pre-operative radiation, it should be a routine to examine radiographically every patient before operation for possible metastatic growths in the lungs, a measure which is not carried out in this country as it should be.

What can the patient lose by pre-operative radiation? Nothing! Changes in cells take place within twenty-four hours. Consequently, in delaying the operation no risk is being run. The necessary treatment can be carried out and the patient allowed to recover from the reaction and the operation performed within three or four weeks, before any fibrosis has developed to hamper the surgeon. The skin reaction will not interfere with the usual healing process to any extent.

Combined Surgery and Radiation.

When the surgeon for some reason is not able to remove the whole growth, it is strongly advocated that irradiation be given directly to the remaining growth through the open wound. If localized, this can be accomplished by radium of sufficient quantity being placed in most favourable positions and supplemented, if necessary, by X-rays through the open wound with skin flaps well drawn back. Tissues

in this way can be given directly more than an erythema dose without any absorption by skin and superficial tissues, which are so preserved for subsequent radiation.

Post-Operative Radiation.

This is a very useful adjunct to pre-operative radiation and should be commenced about three weeks later, by which time the skin has recovered from the previous treatment. If no pre-operative radiation has been given, post-operative radiation cannot be commenced too soon after operation.

It can be realized that the chances of the patient doing well and incidentally of the radiologist doing good are very considerably reduced when the patient is not treated by irradiation when a recurrence, probably inoperable, has occurred. Although it must be apparent that a great deal more can be done in an early case, the radiologist is accustomed to receiving these patients with hopelessly inoperable recurrences, when the disease is disseminated throughout the body. Surgeons often hold that radiation is useless and should not be used in early favourable cases, but they expect results in this late stage of the disease.

Inoperable and Hopeless Growths.

The responsibility for the condition of the patient with inoperable malignant disease rests (*i.*) with the quack cancer specialist, (*ii.*) with the patient who neglects to consult a medical practitioner, (*iii.*) with the practitioner who fails to recognize the disease or attempts superficial surgery.

The dealing of the first-named must be left to the energies of our legislating *confrères*, but the laity and the medical profession must be educated to the fact that early diagnosis and treatment will cure a large percentage of cancers and the laity must be taught that cancer, except in the very late stages, is a painless disease. Almost 100% of people, when asked why they had not previously sought advice on account of a hopeless malignant tumour, will say that they knew it could not be a cancer because they did not have any pain.

In this class of case the radiologist can do more for them than the Chinaman and herbalist combined, by retardation of the growth, if this is humane, and by alleviation of pain, whilst surprising results (by massive destructive doses) are sometimes accomplished, although perhaps only temporarily. Under favourable conditions the main mass may be removed surgically after the first course of treatment. The base may then be radiated through a wide open wound. Finzi, in reference to this type of case, strongly urges that "inoperable" is no longer synonymous with "incurable."

The statistics of these tumours, which no one else will touch, can give no idea of the real value of radio-therapy.

The New German Treatment.

An idea of the technique in a deep-seated growth, for instance, cancer of the uterus, may be of interest. A very careful and complete examination is made to ascertain the location and probable extent of the growth. Full-size sketches are made of various planes from which the quality of the radiation, the focal distance and the number of ports of entry required are determined.

In stout patients this radiation is reinforced with a local radium treatment and the lethal dose is secured in this way. For instance, at Erlangen, where six portals are used, it has been determined that 23% of the erythema dose is delivered at a depth of ten centimetres in a patient of 63.5 kilograms (10 stone) through the anterior-medial portal, 20% through each anterior-lateral, 20% through posterior-median and 15% through each posterior-lateral, the result being 113% of erythema dose. Ulceration of the bowel is found to follow 130% of erythema dose. There seems to be a distinct advantage in administering this "knock-out" dose at one fell swoop, at any rate before the beginning of the reaction. This is entirely in line with radium treatment, where one massive dose is much more effectual than frequently repeated smaller ones.

The actual technique after the treatment has been arithmetically arrived at, calls for precision and extreme care.

The incident beam of radiation must pass through the growth and this is checked in each position by a long dark glass tube (similar to a Ferguson's speculum) with a tiny fluoroscopic screen fixed in its distal end, which is passed into the vaginal vault. Bowels and bladder are emptied before and are kept empty during the *séance*. The abdominal contents over the uterus are compressed to one side when the treatment is applied from the anterior surface.

The sequelæ of these treatments are irradiation sickness, which often lasts for days, malaise, anorexia, vomiting and diarrhœa. Blood changes are marked. Hæmolysis is sometimes severe. Blood transfusion is consequently a routine procedure in asthenic patients. There is a marked destruction of white cells, especially lymphocytes; but these rapidly reappear. It is the disastrous result in the red blood cells that appears to be the serious factor. The average treatment results in the destruction of at least 25% of the red blood corpuscles; their reappearance takes about six weeks.

A further elaboration of this uterine treatment, called the Röntgen-Wertheim, has been introduced, where, after the initial dose is given to the uterus, the right and left parametria are in turn treated at intervals of six weeks. The results showed a percentage of ninety-seven apparently cured when reviewed after two years. Other statistics are almost as encouraging.

Carcinoma of the breast is no longer considered a surgical condition. This, if in an operable state, is a superficial condition and the lethal dose is more easily given. A wide area involving all regions of the lymphatic spread is covered and the results are stated to be far ahead of those from surgical treatment. If the histological changes that take place be considered, it is not difficult to see why this should be so.

Conclusion.

We are not yet in a position to claim that radiation should replace surgery in all forms of malignant disease, probably because our technique and

equipment are passing through a stage of rapid and very important development. Time and experience are required for comparison with results from surgery. There is no doubt that the rationale based on logical and scientific principles must appeal to us and that we have approached the time when the surgeon must realize his total inadequacy to deal unassisted with malignant disease. It is because of the failures that are so frequently occurring in the hands of the most skilful surgeons, that the radiologist must be stimulated to develope the methods of application of radiation to the same degree, with the same zeal, enthusiasm and earnestness as has prompted our great surgeons.

The success of radiation is assured; the future is pregnant with great possibilities which depend to a large extent on the friendly and intelligent co-operation of the surgeon and radiologist.

A CONTRIBUTION TO A DISCUSSION ON THE CAUSATION OF CANCER.[1]

By W. J. Penfold, M.B., B.Hy.,
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Since cancer is a disease of advanced life, I suggest that the progeny of older parents may be more liable to it than the progeny of younger parents. If that were found to be so, it might explain to some extent the low cancer incidence in warm countries and the high incidence of civilized countries; the factor requires investigation. I take exception to Dr. Cherry's postulation of a "proliferin" and an "activator," for lump formation in bacterial colonies can be produced at will by adding to the plates on which the bacteria grow single substances, like lactose on the one hand or monochlor-acetate of soda on the other.

Bacterial Variation and Lump Formation.

Intensive work on the subject of bacterial variation and careful reading of the literature on this subject have led me to think that the cancer problem might be fruitfully attacked in the light of this work. I would like to give to this meeting an outline of my reasons for so thinking. The normal bacterial colonies of *Bacillus coli* and *Bacillus typhosus*, as they occur on agar plates, have a flattened, smooth surface. If, however, we add to such plates some suitable chemical agent, the colonies of these organisms, instead of remaining smooth, will become lumpy. For example, if *Bacillus coli* be grown on monochlor-acetate agar or if *Bacillus typhosus* be grown on iso-dulcite agar, lumps will appear. A consideration of the substances which have been shown capable of producing such lumps, indicates that many of them fall into two classes, *viz.*, substances which will act as foods and be sources of energy to the growing organism and substances which are poisonous and which will therefore inhibit growth and if in sufficient concentration will kill the organism. The bacteria of which these lumps are composed, are found to differ from the pure culture of the strain which was used to produce them. They may have acquired the power to use a particular food which they did not use previously to any extent, or they may have taken on a resistance to a poison to which they were previously more susceptible. The time at which these lumps appear in the colony varies from two to ten days after inoculation in the case of plates incubated at 37° C.. Similarly, the number of lumps produced on the colony may be one or many according to the age of the colony, the substance added to the plate and the organism used. Since these lumps are composed of organisms which differ somewhat from the average of the original organisms put on the plate, and since they arise by the selection of variant forms of the organism, these different chemical bodies, which are capable of producing lumps, may be classed together under the name of "selecting agents." The method of action of these selecting agents, whether they be foods or poisons, is this: They alter the relative rates of growth of the different organisms of which the colony is composed. If, for example, an organism produces a colony of which a few odd members only can use lactose, then on lactose agar these members will be responsible for the production of lumps. If, on the other hand, a suitable poison be added to the plate, that organism in the colony which is more resistant to the poison, will grow relatively more quickly than the rest of the organisms of which the colony is composed and a lump composed of variant organisms will be produced. The minimum time in which a new variety of bacterium can be selected out, has been found to depend, among other factors, on the size of the bacterial population from which a selection is made. The experiments dealing with this phase of the work have been done chiefly in liquid cultures.

It has been found possible to select out new bacterial races from large volume cultures in tubes much more quickly than from similar small volume cultures, but it has not been found possible seriously to alter the time of selection by altering the number of organisms inoculated into similar volumes of broth. That is to say, to get efficient bacterial selection, a large bacterial population is required from which to select. Effective bacterial selection likewise pre-supposes a suitable rate of growth. When the rate of growth is very great, selection is slight; when growth ceases, selection for practical purposes does not take place. Some rate of growth between these extremes is most suitable for selection.

It has been found that a selecting agent which will produce lumps in the colonies of one bacterium, may be quite unable to do so in the colonies of another bacterium, even although the second be of a closely related species. This specificity of the variation process has been used to separate one species from another, *e.g.*, it has been proposed to separate *Bacillus paratyphosus B* from Aertrycke's bacillus by the power of the former to produce lumps on raffinose agar.

Some work has been done in connexion with the length of time that a new character, conferred on a

[1] Read at a meeting of the Victorian Branch of the British Medical Association on March 1, 1922.

bacterium by selection, may persist. Confining our attention to the variants that may be produced from *Bacillus typhosus* when it is grown on carbohydrates, which it is not normally accustomed to ferment, it has been found that those fermentation characteristics which are acquired most readily persist longest, while those that are acquired slowly are lost readily. For example, the lactose-fermenting *Bacillus typhosus* requires a long time for its production and after its selection it is constantly tending to revert to its original character, whereas the dulcite-fermenting *Bacillus typhosus* is easily produced and has little tendency to revert.

The manner in which the cell interacts with the selecting agent is known in some cases, *e.g.*, since *Bacillus coli mutabile*, living on a lactose medium, produces lumps composed of bacteria having the power to ferment lactose, it is reasonable to suppose that the lactose-splitting enzyme is the agent on the part of the cell bringing about the selection. The original *Bacillus coli mutabile* does not ferment lactose. In the case of selection caused by poisons the case is not usually so clear and convincing, but very suggestive evidence that here again we may be dealing with enzyme selection has been brought forward. For example, it has been found that the *Bacillus coli* variant produced on monochlor-acetate agar has a much weaker reducing mechanism than the original organism. In this case the reductase of the cell or alternatively the enzyme producing the reducing substances arising in cellular metabolism may be looked upon as the agent on the part of the cell of this cellular selection. This method of cellular selection gives us a method of disentangling the processes of cell life and studying them individually, which is not possible by any other method.

It has been shown that from *Bacillus dysenteriæ* (Shiga) it is possible to select out a spontaneously clumping strain, although the normal strain from which it is derived gives a uniform emulsion under the same conditions. This applies also to many other organisms. A *Bacillus coli* strain giving normally a good emulsion, gave after growing on monochlor-acetate agar a strain which clumped spontaneously when tested under the same conditions. The tendencies to clump or to disperse are believed to depend on the electrical charge carried by the organism, on the surface tension of the continuous phase of the emulsion and on other factors. The important point for us to note is that changes in the tendencies to disperse or to clump may be brought about by selection.

Physical agents have been shown to act as selecting agents in the case of bacteria, as, *e.g.*, heat, X-rays, ultra-violet light and the like. The nature of this selecting process is probably similar to that of the process of chemical selection.

To recapitulate: It is seen that lumps can be produced in bacterial colonies by the addition of a suitable selecting agent to the medium. This agent may be a food or a poison. The time of appearance of the lumps and the number of lumps which develope, vary with the selecting agent and the organism used. The lumps are due to alterations in the relative rates of growth of the constituent cells of the colony brought about by the selecting agent used. The lumps can be shown to be variants derived from the original bacteria.

The time required for the selection depends not only on the "selecting agent" and the bacterium, but also on the size of the bacterial population from which the selection is made. The portion of the cell, which interacts with the selecting agent to produce the new race, is in some cases at least one of the cell enzymes. By means of selection processes variations in the tendencies to disperse or to clump may also be brought about. Bacterial selections may occur under the influence of physical agents, but they have not yet been studied very intensively.

It is one of the great merits of bacteriology to have elucidated to some extent the chemistry of cellular selection and to have stated some of its principles.

The Bacterial Colony Regarded as a Tissue.

In applying these results of the study of bacterial variation to the consideration of tumour formation, more especially cancer formation, we may look upon the bacterial colony as a tissue. It is composed of millions of cells which have a definite relationship to one another and the section of the colony shows characteristic structure. In the case of any tissue in the animal body similarly we find an agglomeration of cells with some characteristic arrangement. The lump or lumps appearing in the colony in the presence of a selecting agent are analogous to the lumps that may similarly appear in any tissue of the body as a result of the action of a known or unknown selecting agent.

In the case of the bacteria, these selecting agents may be chemical bodies of the nature of foods or poisons or physical agents. Similarly in tumour formation in man it has been shown that coal tar derivatives and bodies related to aniline, physical agents and probably bacterial toxins are all capable of producing new growth. The selecting agent or agents responsible for the origin of cancer in advanced life have not yet been ascertained, but may well be some one or more of the products of defective metabolism. Certain organisms will show lumps in their colony in the presence of a certain selecting agent, while closely related organisms do not show these lumps in the same circumstances. Similarly in the animal body we find that aniline workers show a marked tendency to tumour in the bladder, though they do not appear to have a greater tendency to tumour formation in other parts of the body.

Again, in the case of bacteria the time of appearance of these lumps depends on the organism used, the selecting agent, size of population and the rate of growth. Admitting that the bacterial colony is analogous to a tissue, it is not surprising to find that malignant tumour formation of connective tissue is quite liable to occur in early life. Similarly, while the ordinarily occurring cancer appears in advancing years, young men are commonly affected amongst the aniline workers. This shows that the age incidence depends on the time of accumulation in the body of the selecting agent producing the

tumour. In an aniline factory which employed thirty workers, no less than twenty-nine died of tumour of the bladder in the course of ten years. The size of population is very important in effective bacterial selection and also the rate of growth of the organism. These two factors are probably potent in the production of tumours in man, since irritation is one of the commonest causes of tumour formation. The effect of irritation is to increase the cell population from which a selection can be made. Moreover, the alteration of the rate of growth itself may be favourable to the success of the selection process, as we know it is a very important factor in bacterial selection. The lactose-fermenting *Bacillus typhosus* is constantly tending to revert. An analogous fact in tumour growth may be found in the difficulty we have in transplanting some primary cancers to a new animal of the same species, although the transplanting of the tumour to a new site in the same animal is as a rule comparatively easy. In the latter case we have the selecting agent present throughout the body and therefore able to favour the growth of the variant cells, while in the former case, if the selection is not far advanced, we have the natural tendency to reversion in the absence of the selecting agent and the consequent disappearance of the transplant.

In bacterial selection the portion of the cell interacting with the selecting agent may, in some cases at least, be an enzyme occurring in the cell. The bio-chemical side of tumour growth has been so slightly attacked that we are not yet able to say whether this may apply in cancer or not, but it seems highly reasonable that it should do so.

The lumps that occur on the bacterial colony may be one or many, depending on how our experiment is planned. Similarly in the case of primary new growth in man, while we usually have only a single primary growth, still there can be no doubt that multiple primary growths do occur. One of the reasons favouring the occurrence of a single primary growth is probably the important part played by local irritation in tumour formation in the human subject.

It has been shown that from many bacteria two races may be developed, one of which tends to disperse in normal saline solution and the other of which tends to clump. Under the scheme of bacteriological analogy a simple tumour would represent the spontaneously clumping variety of the organism, whereas the malignant tumour would represent that variety which tends readily to disperse, such dispersion offering an explanation of the tendency of the malignant tumour to permeate the local tissues and to cause metastatic growth in distant parts.

On this theory it seems reasonable to suppose that in aniline workers' cancer we are dealing with a selection process taking place amongst the cells in the bladder wall, the selecting agent being aniline or a related body. An endeavour was therefore made to see if commercial aniline acted as a selecting agent in the case of bacteria.

In my preliminary trials several series of plates of agar with varying quantities of aniline were made and inoculated with *Bacillus typhosus*, *Staphylococcus albus*, *Bacillus coli*, *Bacillus dysenteriæ* (Flexner), *Bacillus diphtheriæ* and *Diplococcus pneumoniæ*. The results obtained are only preliminary, but a *Bacillus coli* and *Bacillus dysenteriæ* (Flexner) have given well marked lump formation and other evidences of the selection of variants. The commercial aniline was then treated by Mr. F. J. Considine with solid caustic potash and afterwards distilled and collected from an air condenser; this treatment was repeated five times, so that the product was nearly colourless. It conformed to Merck's reagent tests for impurities. The selection experiment was then repeated with the purified product. With *Bacillus coli* fairly good lump formation occurred on the colonies, while in the case of *Bacillus dysenteriæ* (Flexner) the lumps were not very definite. This suggests that the effect we have obtained is due in the case of *Bacillus dysenteriæ* (Flexner) at least, to some accompanying impurity rather than to the aniline itself. The aniline workers are known to be exposed to poisoning by toluidin, benzidin and naphthalamine, as well as by aniline itself. It is proposed to test these substances individually, to see if any of them show great selective power when tested against a series of bacterial species.

The further possible steps of the investigation of tumour and cancer formation on this hypothesis are varied. If bacteria are found to be good indicators of selective power in the case of cancer-producing agents, as our preliminary work suggests to be possible, various substances might be added to plates to neutralize chemically the selecting agent in respect of its selecting power or substances capable of conducting counter-selections in an opposite direction might be sought for and their presence indicated by bacterial tests.

The scheme of inquiry into aniline workers' cancer, therefore, resolves itself in the first place into the identification of the selecting agents by means of the production of lumps by these agents in suitable bacterial colonies and the ascertaining of those substances which will neutralize this selective power. In the second place the effective selecting agents in the pure state might then be administered in small quantities over prolonged periods to suitable animals and evidences of tumour formation in the bladder sought for. If such tumours could be so produced, then non-toxic substances, which had been found in the plates to prevent selection, could be tested *in vivo*.

Similarly if it were found possible to cultivate bladder tissue *in vitro*, the supposed selecting agent might be tested for its selective effect on such tissue and in the event of these experiments being successful, neutralizing substances could be sought for.

In the case of cancer developing in late life the finding of the selecting agent or agents will probably be difficult. It seems most likely, however, that the agent may be a product of defective metabolism, which product accumulates within the body. All the known intermediate bodies which arise within the body in the metabolism of the proteins, purins, carbo-hydrates and fats should be tested in turn for the discovery of selective power.

Reports of Cases.

BILATERAL PRIMARY SOLID OVARIAN CARCINOMA.

BY WILLIAM T. CHENHALL, M.D., F.R.C.S.,
Honorary Surgeon, Royal Hospital for Women, Sydney.

History.

E.D., aged 64 years, was admitted to the Royal Hospital for Women.

I am indebted to Dr. James Bogle, Resident Surgeon, for the following notes and to the Pathological Department of the University of Sydney for the photographs.

The patient upon admission complained of abdominal pain during the previous six weeks. Dr. Bligh had attended her during the latter portion of this period, when she was suffering from an attack of acute pelvic inflammation of obscure origin. He transferred her to the Royal Hospital for Women under my care. The severity of the pain had recently increased a great deal and assumed a "bearing down" character. The distribution of the pain was bilateral. The usual signs of an inflammatory lesion were present, but ill-defined in location.

She had borne four children, the youngest being twenty-four years of age. Menstruation had entirely ceased at the age of fifty-five.

Urination was frequent both day and night and the urine contained a trace of albumin. Her mother had died from cancer of the uterus.

Examination.

Examination revealed in the left fornix a mass about seven centimetres in length and five centimetres in thickness, irregular in shape and of a peculiar "rubber-like" consistence. There was no fluctuation. The mass was movable, but extremely tender on palpation. The right ovary consisted of a similar but smaller mass. Each mass, under the finger, gave the impression of a "roughened" surface.

I made a provisional diagnosis of papillomatous overgrowth of both ovaries, possibly malignant.

There was no distinct evidence of cachexia and only a slight loss of weight had been noted.

The Operation.

Through a mid-line incision I observed each ovary enlarged as described and lying in a pool of peritoneal fluid. About 600 cubic centimetres (20 ounces) of deep orange-coloured and blood-stained fluid were removed. Recent inflammation had occurred.

The ovaries were gently enucleated from a mass of

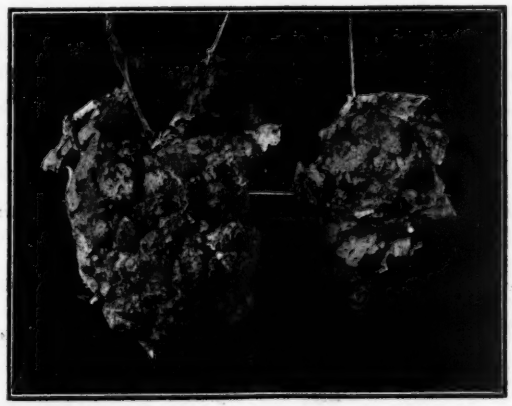

FIGURE I..

FIGURE II..

pelvic adhesions formed by the omentum and pelvic colon, elevated and removed.

I drained the "pool" area by a large gauze wick through the vaginal vault and a drainage tube in each flank. The abdomen was closed in the usual four layers.

The patient was a bad subject for operation. I did not disturb any of "Nature's barriers." There was considerable erosion—inflammatory or malignant and probably both—of the contact surface of the pelvic colon.

Curiously, I could not find evidence of glandular enlargement in the iliac or lumbar glands, though, with inordinate zeal, I sought for them as a matter of pathological interest. Neither did the surface of the uterus, itself atrophied, show evidence of invasion.

The patient's recovery stands as a tribute to the skill and care of the hospital staff.

Drainage was quite free, thus amply justifying my precautions. Convalescence was slow, but the patient left hospital at the end of the fourth week. She is now quite free from pain and has increased in weight.

Commentary.

Rarity alone warrants report of this case. Among my private records of nearly eight thousand gynæcological cases, I have not hitherto met precisely the same condition. Neither can I recall a single case from the records of many years of public hospital service.

Even the literature upon the subject is scanty and the pathology is impregnated with uncertainty.

Massabaum and Etienne collected 250 cases of solid ovarian carcinomata.[1] They form a difficult problem for the pathologist, partly owing to the difficulty of distinguishing between primary and secondary growths and partly owing to the tendency of adenomatous and papillomatous tumours, originally innocent, to undergo malignant change and to initiate metastases.

Frequency.

My own observations regarding the rarity of this lesion are attested by Schmidlechner at the Budapest clinic. Out of 50,000 patients, 720 were operated upon for ovarian tumours. Of these 720 tumours, 147 were malignant. In only 112 was a satisfactory microscopical examination made and of these 35 proved to be solid carcinomata.

Age.

No age seems exempt. Primary carcinoma of the ovary has been found at all periods of life between four years and extreme old age. It occurs most frequently during the years of active sexual life, that is, between twenty-five and forty-seven.

Morbid Anatomy.

These growths may be unilateral or bilateral. The records make them appear almost equally so. It is probable that in the early stage one ovary only is affected.

Thus, in the case under review, the left ovary was almost double of the other ovary in size and weight.

Direct spread would seem to have occurred and the ovary, being practically unprotected by peritoneum, would exhibit less resistance to invasion than would adjacent structures.

Lymphatic Invasion.

As already stated, I could not find evidence of glandular involvement, but surely it had occurred. It must be remembered that the lymphatics from the ovary drain into the lumbar and renal glands and into the small accessory glands along their path. Further, anastomosis with the uterine lymphatics is free and it may reasonably be believed that extensive invasion has already occurred and renders the prognosis distinctly grave.

Curiosity excited desire to investigate the extent of lymphatic invasion in a case of apparently long duration, but my exploration was limited by Nature's barriers against purulent infection and these I deemed it expedient to leave intact.

A description by Professor D. A. Welsh of the pathological specimens, of which two reproductions of a macroscopical and a low-power microscopical photograph are given, will be published in an early issue.

Reference.

(1) Eden and Lockyer: "System of Gynæcology."

Reviews.

THE ORGANS OF INTERNAL SECRETION.

Dr. J. Geikie Cobb's book on the organs of internal secretion[1] is a typical example of the loose thinking and loose writing which, apparently for many people, passes for knowledge of the functions of the endocrine glands. A few established facts, a great many guesses and many fallacious deductions make up the greater part of the book.

The chapter on "The Physiology of the Internal Secretions" gives a brief but well-balanced account of what is known as to the physiology of the ductless glands. The sections on the physiology of each of the glands treated are, on the whole, good, but the author is rather inclined to accept as proven facts what are at best guesses.

The section on the thyreoid gland is the best in the book, probably because more is known about the functions and diseases of this gland. It is difficult, however, to believe that all the symptoms said to be due to minor degrees of thyreoid insufficiency can have such a causation.

The author quotes Sajous on the effect of insufficiency of the adrenals: "It means inadequate oxidation and therefore imperfect tissue metabolism and nutrition, also impairment of the auto-protective functions of the body at large." This is a sweeping assertion and quite unsupported by acceptable evidence, but it is only one example of the many passages in which the author quotes equally unsupported statements, either without comment or with approval.

A section on "The Internal Secretions of Digestion" is particularly rich in sentences beginning: "It has been supposed," "Some observers believe" and the like, but no evidence is afforded as to why the suppositions should be accepted, although the author apparently is prepared to accept many of them and states that they explain many things. On the other hand, in many parts of the book the author reviews the evidence available in a thoroughly critical spirit. From what has been said, it can be seen that the book contains much good grain, but it is so mixed with chaff and with such an abundance of chaff that it is difficult to sort it out.

[1] "The Organs of Internal Secretion: Their Diseases and Therapeutic Application: A Book for General Practitioners," by Ivo Geikie Cobb, M.D., M.R.C.S.; Third Edition; 1921. London: Baillière, Tindall & Cox; Crown 8vo., pp. 352. Price: 10s. 6d. net.

Naval and Military.

APPOINTMENTS.

The following information has been published in the *Commonwealth of Australia Gazette, Nos.* 30 and 32, dated April 6 and 13, 1922:

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Appointment.

William Keverall McIntyre to be appointed Surgeon-Lieutenant (on probation) and as Sub-District Naval Medical Officer, Launceston. Dated 2nd December, 1921.

Promotion.

Surgeon-Lieutenant Herbert Grindell Hurrey, M.B., B.S., is promoted to the rank of Surgeon-Lieutenant-Commander. Dated 1st July, 1921.

Australian Military Forces.

First Military District.

Unattached List.

The undermentioned officers are re-appointed to the Unattached List from the dates stated against their respective names: Colonel G. P. Dixon, C.B.E., 5th December, 1918; Captain (Honorary Lieutenant-Colonel) J. E. Dods, D.S.O., M.C., 29th April, 1917.

Second Military District.

Reserve of Officers.

Captain W. L. Cleland is transferred from the Reserve of Officers, Fourth Military District, 1st April, 1922.

Major M. Yuille is transferred from the Reserve of Officers, Fifth Military District, 1st April, 1922.

Major G. B. Carter is transferred to the Reserve of Officers, Sixth Military District, 1st April, 1922.

Third Military District.

Australian Army Medical Corps.

The resignation of Captain J. H. D'Amer-Drew of his provisional appointment is accepted, 8th March, 1922.

Reserve of Officers.

The resignations of Captain H. F. H. Elvins and Honorary Captain E. H. Fyffe of their commissions are accepted, 21st March, 1922.

The commission of Honorary Captain G. N. Lorimer is cancelled under the provisions of Section 16 of the *Defence Act* and Australian Military Regulation 158 (*a*), 31st March, 1922.

Fourth Military District.

Australian Army Medical Corps.

Major H. C. Nott is transferred to the Reserve of Officers and to be Lieutenant-Colonel, 1st April, 1922.

Reserve of Officers.

Captain W. L. Cleland is transferred to the Reserve of Officers, Second Military District, 1st April, 1922.

Captain A. R. Bean is transferred to the Reserve of Officers, Fifth Military District, 1st April, 1922.

Major W. H. Collins, D.S.O., is transferred from the Reserve of Officers, Second Military District, 1st April, 1922.

Fifth Military District.

Australian Army Medical Corps.

Major J. Kenny to be appointed from the Reserve of Officers and to be Captain, 2nd March, 1922.

Reserve of Officers.

Major M. Yuille is transferred to the Reserve of Officers, Second Military District, 1st April, 1922.

Captain A. R. Bean is transferred from the Reserve of Officers, Fourth Military District, 1st April, 1922.

Sixth Military District.

Reserve of Officers.

Major G. B. Carter is transferred from the Reserve of Officers, Second Military District, 1st April, 1922.

The Medical Journal of Australia

SATURDAY, APRIL 29, 1922.

An Experiment in Hygiene.

The story told by Dr. Franklin Royer in another part of this issue is one which must attract profound attention. The accidental possession of a large sum of money collected for a particular purpose but not needed for that purpose is very unusual. The appalling disaster which befell Halifax on December 6, 1917, impelled the good people of Massachusetts to make immediate provision for the stricken inhabitants. As soon as the British Government determined that the cost of reconstruction and of compensation would be borne by the British Exchequer, the fund was no longer required. It was then a difficult question to decide to what purpose it could be put. It was obvious that the moneys could not be returned to the numerous donors. On the other hand, the committee, acting as trustees, were bound to apply it for the original purpose or for a purpose closely related to it. The ingenuity of Dr. Heiser, the Director for the East of the International Health Board, provided a solution of a difficult problem. It was apparent that in the reconstruction period the surviving people of Halifax would be placed in an unfavourable environment and that through overcrowding, absence of workshops and factories, artificial economic conditions and almost universal nervous instability caused by the tremendous shock of the explosion the public health would suffer. Employment would be limited at first; home conditions would be unsatisfactory; the aftermath of a sudden, overwhelming disaster would be severe. What better conditions could be imagined for an experiment in public health administration? The idea that the public authority should be relieved for a period of five years of the main necessity of providing money for work in hygiene and preventive medicine was at once fascinating and bold. The Commission accepted the responsibility of performing the usual duties of a public health authority and of planning this work on a scale which could be regarded as ideal. Departments of Public Health are usually compelled to work economically and to measure their activities in accordance with the grants of money grudgingly accorded for these purposes. It is rare that a department is enabled to carry out a full programme, for Treasurers are apt to regard money provided for health purposes as unproductive and of secondary importance.

Dr. Franklin Royer has described the plan of work. The Halifax experiment will be watched with keen interest by experts in all countries, because this is probably the first occasion in the history of hygiene in which a sufficient sum of money has been placed in the hands of the health authority without reserve. It must be remembered that the community is a small one and that the expenditure on health measures must be calculated on the basis of so much per head. The programme includes the establishment of many well-planned organizations working in conjunction with the central authority. The pre-school age dental clinic is the second of its kind and certainly represents an advanced conception of preventive work. Judged from the distance, it would seem that the several activities are adequately balanced and that the organization is eminently sound. It is with satisfaction that we note the prominence given to the care of infants and young children. Again, the coordination of the various branches of the work and the insistence on a continuous system of home visiting to control the results of curative and preventive work are highly promising. The organization, once it is well established and fully recognized, should suffice to cope with outbreaks of infective diseases. If ingenuity be exercised, if courage be shown and if sufficient energy be expended, it should be possible not only to check outbreaks of diseases like diphtheria and enteric fever, but also to reduce the incidence of these and other diseases to a very low level.

The experiment is to last for five years. The Commission is seeking financial and other aid from the municipality to amplify the scope and extent of the undertaking. It may be assumed that the Commission will not part with its valuable freedom of

action and independence of political control which characterize this interesting hygienic event. We have invited Dr. Franklin Royer to continue his story by means of yearly interim reports, so that the readers of The Medical Journal of Australia may be able to judge the result of the experiment. The success will have to be measured by the incidence of infective disease and by the standard of communal health. Allowance will have to be made for the plight of the community at the beginning of the experiment. For this reason it would be unfair and unwise to set up at this stage an arbitrary measure. For the same reason it would be premature to endeavour to gauge the value of the integral parts of the organization until the evidence has been presented and can be weighed with accuracy. The Medical Journal of Australia is greatly indebted to Dr. Franklin Royer for the first chapter of his interesting story.

THE NATURE OF CANCER.

Cancer, that scourge which wends its fateful way into so many homes, to wreak destruction and dismay, has been the despair of the pathologist. It has been regarded as a parasitic disease by many, but none of the supposed causal organisms has been accepted as its true cause. Henry Butlin was probably right when he admitted that cancer was a parasitic disease in that the constituent cells of the malignant growth acted as parasites on the body. It is useless to enumerate the many earnest investigators who have claimed to have found the cancer parasite. Virchow held that under certain unknown conditions the whole body might react abnormally to definite stimuli. He postulated a normal response of a healthy cell to an ordinary stimulus as either natural growth or the performance of a natural function. The stimulation by food of the pyloric glands would produce a secretion of an acid and pepsin. Abnormal stimulation too often repeated would not only alter the response chemically and physically, but would lead to remote changes in the irritability of body cells. Virchow conceived a set of circumstances which might cause certain over-stimulated cells to refuse to perform their physiological functions and to revert to a process of reproduction unrestricted by the needs of the developing body. He regarded the purposeless and unlimited multiplication of cells in a malignant neoplasm as Nature's protest against an excessive stimulation of cells which had in some manner become over-sensitive to even normal stimulation. At times the cells attacked were normal tissue cells; at other times they were embryonic cells which had become included in the adult tissues, as it were by accident. Ribbert's theory appears to have been inspired by Virchow's views. From this beginning, various modifications of Ribbert's theory have been devised, but the conception of a fundamental alteration of the response to stimulation appears to have been forgotten until quite recently. A few years ago pathologists were encouraged to attack the problem afresh when Fischer showed that the injection of chemical substances such as *Scharlach Rot* could induce a cellular hyperplasia indistinguishable in its histological characters from carcinoma. Later evidence was accumulated that cancers could be produced by tar, by pitch and by radio-active substances. Further consideration, however, soon revealed that there is nothing essentially specific in these chemical and physical reactions. The agents are irritants and it has long been known that irritants have some ætiological association with cancer. The mouse cancer research has not led to the discovery of the mechanism of production of cancer in human beings. E. Freund claimed to have demonstrated that the serum of every person suffering from carcinoma contains a specific, pathological nucleo-globulin. His evidence, as far as it went, was suggestive, but this channel too proved a blind end.

In the discussion on this important subject recently held in Melbourne, Dr. Thomas Cherry has marshalled a great array of valuable facts and has called to his aid a wealth of statistics which he used in a most ingenious manner to prove that cancer is a product of civilization. His hypothesis that the apparently greater incidence of cancer in persons of sedentary occupations as compared with the heavy manual labourer, whose habits and customs are not remarkable for luxuries or dainty fare, is not entirely borne out by the figures he quotes. Moreover, employment of statistics to sup-

port a hypothesis is somewhat risky, for it has often been pointed out that figures can be made to prove anything under the sun.

The second part of Dr. Cherry's theory is even of greater interest. Although he stated in reply to a question that he had evidence of the presence of a substance which he calls "proliferin," it is much to be regretted that this evidence is not yet available. It would seem that the "proliferin" of Dr. Cherry would serve approximately the same function as Fischer's epithelial "attraxin." If Virchow's conception be correct, it is conceivable that the over-stimulated cells which have acquired an abnormal sensitiveness to stimulation, might elaborate a ferment which would react continuously on the cells themselves, thus setting up a vicious circle. Even Dr. Cherry's activator might find a place in the scheme. But before such a complex mechanism could be accepted, it would have to be shown that the process would be incomplete without these peculiar substances. Dr. Cherry has not produced sufficient evidence to compel our acceptance of the existence of "proliferin" and the activator.

That cancer cells may produce pathological chemical substances seems highly probable. It must be remembered that they live a parasitic life. They increase and invade in a disorderly manner. They perform no ordered physiological function, but live and die without contributing anything to the output of the body. Eventually they carry complete destruction to their host. Nothing could be more probable than an irregular and incomplete dissociation of the constituents of these wasteful cells and the liberation of bodies like those described by Freund.

That one or other of these dissociation products may be endowed with the quality to stimulate the surviving cancer cells to further hyperplasia is not improbable. This, however, would merely serve the purpose of increasing the intensity of the process. It would not intiate it. For the present it must be assumed that neither Dr. Cherry nor any of the keen investigators who have preceded him in this maze of bewildering difficulties, has disclosed the true cause of cancer beyond all doubt.

THE DIAGNOSIS OF GASTRO-INTESTINAL CANCER.

Many attempts have been made to discover some means of distinguishing malignant from benign lesions of the stomach. The fact that every chronic gastric ulcer is a potential cancer renders it eminently desirable for the physician to have at his disposal a test which might warn him of the presence of malignant disease in this organ. Formerly it was thought that the presence of lactic acid in the gastric secretion was diagnostic of carcinoma. In the early stages lactic acid is often absent and even in advanced disease much reliance cannot be placed on its presence. Again, it was formerly held that the detection of sarcinæ in the vomit or gastric washings was of diagnostic significance. This occurrence, too, has been found to be a frail foundation for a diagnosis. The diminution or absence of hydrochloric acid is not characteristic of gastric cancer; there are many other conditions in which this sign is to be noted. Dr. J. F. Wilkinson has recently dealt in this journal with the possible significance of absent or diminished hydrochloric acid in the gastric secretion and from this careful study it will be seen that the differential diagnosis between malignant and benign affections of the stomach cannot be based on the quantitative estimation of hydrochloric acid, especially before other signs and symptoms are well developed. Skiagraphy is extremely useful when the cancer is advanced, but it is necessarily incapable of disclosing early malignant degeneration.

Clinical bio-chemists have recently sought for information concerning the changes in metabolism in divers diseases. Some observations have been the result of a logical anticipation of the effect of a disturbance of the functional activity of specific organ cells. In other directions empirical tests have been applied and an explanation has been sought after the nature of the metabolic disturbance has been determined. Among the latter is the alteration of the tolerance of the body to an excessive intake of sugar as revealed by the rapidity with which sugar disappears from the blood, said to be associated with carcinoma of the gastro-intestinal tract. About a year ago Drs. Julius Friedenwald and George H. Grove pointed out that in cancer of the gastro-intestinal tract the blood sugar curve after the ingestion of one hundred grammes of dextrose differed from that registered in normal persons or persons suffering from carinoma of other parts of the body. They claimed that this test might be employed as a means of differential diagnosis in established cancers and hinted that it might also prove of value in the early stages. They have now the results of the application of the test in seventy-five persons with carcinoma of the gastro-intestinal tract.[1] In the normal individual the sugar content of the blood rises after ingestion of one hundred grammes of dextrose within three-quarters of an hour to between 0.15% and 0.18%. The fall to the normal level of between 0.09% and 0.13% follows before the end of the second hour. The observers found that this typical normal curve ob-

[1] *The American Journal of Medical Sciences*, January, 1922.

tained in persons suffering from non-malignant affections of the gastro-intestinal tract. At times an atypical curve was recorded in which the rise was practically the same, but the fall was incomplete within two hours, the values at this period being between 0.13% and 0.15%. This so-called atypical normal curve was noted in connexion with *achylia gastrica*. In the next place, they describe an intermediate curve. This consists in an initial sugar content of the blood of between 0.1% and 0.17%. In three-quarters of an hour a maximum of between 0.2% and 0.23% is reached. During the following seventy-five minutes the fall is gradual and does not reach a level lower than between 0.18% and 0.22%. This curve is associated with carcinoma outside the gastro-intestinal tract. The curve of cancer of the gastro-intestinal tract reaches a slightly higher maximum and the level is maintained until the end of the two hours. This curve was obtained from the blood analyses of seventy-two patients with cancer of some portion of the digestive canal. It was not obtained in two instances of general carcinomatosis and in one of rectal carcinoma. The blood sugar of five patients suffering from other diseases, such as tuberculous peritonitis, gastric syphilis and cholelithiasis, followed this type. In other words, if the failure on the part of the blood to get rid of the excess of sugar be regarded as a response to the dextrose ingestion test, it was apparently an indication of cancer of the gastro-intestinal tract in seventy-two out of seventy-five persons and gave a false indication in only five persons out of a very large number. The authors, however, do not regard the characters of the curve as specific for this form of carcinoma, but merely as an aid in the differential diagnosis. They find that this indication appears before the patient becomes cachectic, but we would point out that the absence of cachexia is not synonymous with early cancer. As a diagnostic sign the blood sugar tolerance test may be of value when other diagnostic means are available. There is at present no evidence that it is reliable at a time when the differentiation between malignant and benign disease is of the greatest importance.

THE EFFECT OF TREATMENT OF SYPHILIS.

Buried in the overwhelmingly large library dealing with syphilis there are many isolated and contradictory records of the ultimate results of treatment of syphilitic infections. Formerly it was held that a cure could be effected if the patient were subjected to a course of treatment with mercury extended over six months or more, followed by a prolonged course of iodides. Later it was found that the evidence of cure after such a double course was not good. Tertiary lesions and late syphilitic manifestations involving the central nervous system often appeared, in spite of the free exhibition of mercury, while the assumed power of iodides to attack the virus was disproved shortly after Hoffmann and Schaudinn demonstrated the ætiological relationship between syphilis and the *Spirochæta pallida*. Few records exist of the condition after ten years or more of a large series of patients energetically treated with mercury. With the introduction of the arseno-benzol drugs a new hope was awakened that cure would be more rapid and more certain. A few cautious observers questioned the completeness of the cure, even with the arsenical preparations. The proof of actual cure was produced in a few isolated instances. It is held on what appears to be unassailable evidence that superinfection is impossible. In these isolated instances the patient was found to be suffering from a chancre caused by typical *Spirochæta pallida*. Early treatment was instituted and all the signs and symptoms disappeared. The blood serum no longer yielded a reaction to the Wassermann test. The individual then exposed himself again to infection and a definite primary syphilis with spirochætes in the sore developed. This form of proof of complete cure, however, is fortunately rare. It is also useless from the point of view of prophylaxis. The life insurance offices have not been able to discover the frequency of late recurrence after energetic treatment, because these late lesions are not necessarily fatal and because the evidence of their syphilitic character is not always available. The most eloquent advocacy for the modern form of treatment would be sought in the *post mortem* room. It would be possible to collect in the course of several years definite evidence of the persistence of an active infection or the absence of such persistence in persons who had been treated under known conditions not less than ten years before. In the absence of information of this kind, records of presumptive cure after a long period must be welcomed. Professor H. G. Irvine has recognized the difficulty surrounding this question and has endeavoured to ascertain the fate of two hundred and fifteen patients treated in the Dermatological and Syphilis Clinic of the University of Minnesota.[1] In the years 1915 and 1916 these patients were under treatment. At first there was no "social worker" employed to keep in touch with the patients and in consequence many could not be traced. In all, Professor Irvine was able to get in touch with forty-three out of the two hundred and fifteen patients. Of the remaining one hundred and seventy-two, no less than one hundred and thirty-nine attended for treatment for less than six months. These patients would therefore be useless for the purpose of estimating the value of thorough treatment. The treatment given to the forty-three patients and to eleven private patients added to the group consisted in the alternating application of mercury and "arsphenamin" (*i.e.*, arseno-benzol drugs). Two weekly injections of mercuric salicylate or inunctions were given for six weeks, followed by four to six weekly injections of the arsenical compound. Nine patients were admitted within a few months of infection. They received energetic treatment for from six months to one year. All these patients were still free from signs of syphilitic infection after five years. There were twenty-nine patients whose treatment was begun at an early stage, although the disease was well established in all. The power of the serum of these

[1] *The Journal of the American Medical Association*, November 19, 1921.

patients to react to the Wassermann test disappeared as the result of treatment and this power did not return. Then come eleven patients who were subjected to treatment for old-standing infections with chronic manifestations or mental or nervous involvement. The author leaves the reader in doubt concerning the degree of improvement achieved by the treatment. In one sentence he announces that they presented some symptoms, while in another he records that several of them were "clinically well" at the end of the period, notwithstanding the fact that their serum reacted to the complement fixation test. The remaining five patients are of no significance; one died, while the diagnosis was questioned in one or more and the treatment was incomplete in the others. The author claims that even the limited amount of information resulting from this study indicates that the present method of treatment is adequate. It would appear to us that the results are encouraging but by no means conclusive. The number of cases is too small, the time too short and the evidence of cure insufficient. Perhaps some Australian workers may be able to produce further evidence on this important subject.

THE SIGMA REACTION.

Sixteen years ago Wassermann, Neisser and Bruck introduced a test based on the Bordet-Gengou reaction of complement fixation for the recognition of syphilis. Since that time the amount of experimental and other investigation into the nature and significance of the so-called Wassermann reaction has been enormous. The test has proved itself of immense value in clinical work and has attained a secure position among diagnostic methods. It has been pointed out over and over again that, while a complete inhibition of hæmolysis indicates a syphilitic infection, the significance of the failure of the patient's serum to fix complement may not be regarded as evidence that the patient is not infected. At the present time there is an insistent demand on the part of leading bacteriologists for the introduction of a standardization of technique and of reagents. All admit that in order to obtain consistent results meticulous care has to be taken in the performance of the tests and the persons performing them must be experienced and well trained in laboratory methods. In these circumstances it is not surprising that attempts have been made to simplify Wassermann's original technique. Success has not attended these attempts. During the course of 1920 the proposal was made to employ another biological test in the place of the complement fixation test in the diagnosis and control of syphilis. This other test is the flocculation test. Sachs and Georgi noted that when the globulin of serum is partly thrown out of solution, complement action disappears. Extending their experiments, they found that the addition of organ extracts and cholesterin to the serum of syphilitics caused a flocculation of the globulin. They devised a technique for the purpose of ascertaining whether this flocculation yielded results comparable with those of the Wassermann test. In over twelve thousand trials the two tests coincided in 92.44%. Last year Dreyer and Ward published a modification of the flocculation test, which they renamed the "sigma" test. They prepared an alcoholic extracts of heart and added cholesterin according to a known formula. This extract possessed a standard opacity. The serum of the patient was delivered from special pipettes into the extract in varying dilutions. The mixture was placed in a water bath for seven hours and the presence of flocculi was then determined by a hand lens. Each batch of extract was standardized against a standard extract and the so-called "suspension factor" determined. The number of flocculation units when multiplied by the suspension factor yielded the number of the "sigma" units. It is by no means clear why the name of the test was changed from the flocculation test.

Dr. A. F. Rook has employed Dreyer and Ward's technique and records the results which he has obtained.[1] He points out that the test is much simpler to apply than the Wassermann test, although he experienced considerable difficulty in connexion with Dreyer's special pipettes and test tubes, on account of their varying calibre. Sachs and Georgi's technique was not quantitative and was consequently easier to apply. It was found that when blood serum was used, four "sigma" units were necessary before the reaction had any diagnostic significance. In the case of cerebro-spinal fluid, a reaction was registered if more than one "sigma" unit was obtained. The first group of 231 patients comprised syphilitics who had either received no treatment or who had been treated several years previously. The flocculation test and the Wassermann test coincided in 95.7%. A clinical diagnosis of syphilis was made in 46.7%. The results of the two tests differed with the serum of ten patients. In the majority of these the new test appeared to yield results more in consonance with the clinical findings than the Wassermann test. On the other hand, the test seemed to be slightly less valuable with cerebro-spinal fluid. In the next group there were 377 patients who had been treated for syphilis. The two tests yielded similar results in 80.2%. A reaction was obtained in 33.2%, while in 47% no reaction was obtained. Discordant results were encountered in 19.8%. The tests were applied to the cerebro-spinal fluid of twelve of these patients. They were in agreement in seven. In the remaining five the Wassermann test yielded a reaction, but the flocculation test did not. From the evidence offered, it would seem that the arbitrary fixing of a unitage below which the result of the test is not regarded as a reaction, needs further investigation before it can be accepted.

There is an undoubted advantage in performing the test quantitatively, but greater uniformity of the extract is needed than Dreyer and Ward have been able to devise. Sufficient information is available to indicate that the flocculation test in some form or another will prove itself to be of value in the future, more especially because it is much simpler than the Wassermann test.

[1] *The Lancet*, January 21, 1922.

Abstracts from Current Medical Literature.

ORTHOPÆDIC SURGERY.

Pseudo-Coxalgia.

Harry Platt (*British Journal of Surgery*, January, 1922) presents the results of investigations in the subject of pseudo-coxalgia. He reviews the literature and gives Legg, of Boston, the credit of having published one of the most authoritative expositions on the subject. The disease differs from tuberculous coxitis in the absence of atrophy of the thigh and buttock and in the complete absence of localized thickening and swelling of the soft tissues round the joint. The limp is usually an early sign, insidious in its development, often intermittent and accompanied by little or no discomfort. Rigidity may be present, but is not accompanied by pain. The radiographic findings are distinctive and upon their recognition depends the certain diagnosis of the disease. Irregular pyrexia may be present. Details of thirty-five cases are given, including radiographic findings at different stages of the disease. The changes in the head and neck of the femur precede the onset of symptoms, continue to progress during the manifestations of objective signs and may continue after signs and symptoms have subsided. Pseudo-coxalgia is by no means rare, though the figures of frequency vary considerably. One writer claims to have discovered 41 examples in 243 hip-joint lesions admitted to a special hospital. The disease shows a clear predilection for the second half of the first decade. The author considers this a distinctive feature in contrast to tuberculous disease of the hip, which usually begins before the age of five. It is not rare to find the disease occurring bilaterally. As regards causation, there is little more than a mere clinical association between the development of the disease and the previous infliction of a definite injury to the hip-joint. Signs of rickets are often met with as an accompaniment, but in the author's opinion this also is purely a chance association. Congenital abnormalities of ossification, syphilis and infection have each been advanced as a cause, but without satisfactory proof. The author's view is that there is strong evidence for considering the disease distinctly inflammatory, but on the whole the morbid process appears to belong to a type of inflammatory bone lesion in which the infective agent is of attenuated dosage or potency. He rejects the idea that the tubercle bacillus is the responsible agent. Attention has been drawn to the close resemblance of certain transformation changes in the femoral head to those seen in the tarsal scaphoid in Kohler's disease. Both lesions have certain clinical features in common, but in distinction to the hip condition the scaphoid always returns to its normal shape and the incidence of Kohler's disease is lower. In the period of adolescence the reaction of the hip-joint to the type and grade of infection, which produces pseudo-coxalgia at an earlier age, is manifested by the production of *arthritis deformans*. As regards treatment, conservative measures directed towards the elimination of weight bearing has no proved influence on the train of morbid changes, but its application is indicated during the stage of prominent symptoms. Operative interference directed towards the removal of the dominant lesion has no present place in the treatment of this disease.

Non-Union of Fractures.

H. J. Waring and E. T. C. Milligan (*British Journal of Surgery*, January, 1922) deal with the non-union of fractures and treat the subject under two headings: (*i.*) Cases in which apposition obtains. (*ii.*) Cases where there is want of apposition from longitudinal displacements. There are certain areas in some long bones where there is a definite tendency to failure of repair, even though apposition obtains and sound treatment has been carried out. The middle two-fourths of the shaft of the humerus, the lower third of the tibia, the neck of the femur, the upper two-thirds of the shaft of the femur are instanced. Treatment where apposition obtains is illustrated in the case of non-union of the middle two-fourths of the humerus. A preliminary operation is done in which the fibrous tissue of the soft parts is excised. The unhealthy bone at each end of the fracture is then removed in such a manner that the fracture line is bounded by healthy bone and the medullary cavity is laid open. All loose fragments are removed. If no suppuration occurs a second operation is performed after three weeks and the bones are either stepped or comminuted by means of an osteotome or bone-cutting forceps. Great care is taken to preserve the periosteum and the comminuted fragments are not detached. The limb is fixed by splinting and the fragments are pressed together. After two weeks there is no tendency for the ends to separate, but the position must be maintained until union occurs. When there is want of apposition a preliminary operation is done for the excision of fibrous tissue and to bring the freshened fractured ends together. At a second operation these ends are comminuted and impacted as in the previous case. The advantages of this method of treatment are: (*i.*) To convert a transverse or slightly oblique fracture into an impacted comminuted one, which Nature always repairs. (*ii.*) The reparative processes of bone are stimulated by the severe trauma employed. (*iii.*) The amount of interference with soft parts is a minimum, only an excision to expose the fracture being necessary. It appears to the authors that failures following plating and wiring might be explained in that the positions in which non-union occurs in Nature are reproduced by these operations. Plates may even prevent the apposition of fractured ends by holding them apart.

Tendon Transposition.

M. A. Bernstein (*Surgery, Gynecology and Obstetrics*, January, 1922) draws attention to the clinical aspect of tendon transplantation. He introduced a method by which the tendon and the peri-tendinous structures were transplanted together into the new position. The methods of tendon transplantation practised at the present time have not accomplished the satisfactory results which were claimed for them. Even the method of Biesalski and Mayer has the objection that in passing the tendon into the tendon sheath of the paralysed muscle a condition like teno-synovitis is set up which interferes with the function of the transplanted tendon. The reason why tendon transplantation frequently fails is that the tendon becomes fibrous or adhesions form between the tendon and the tissue surrounding it in its new position or that deformities were not first of all corrected. The author in carrying out his method of transplantation removes the tendon to be transplanted from its surrounding tissue by means of a pair of scissors, taking with it as much of the peri-tendinous structure as possible. Where a tendon occupies a sheath in common with another muscle the free edges of the tendon sheath are stitched together so as to enclose the whole tendon before it is put into its new position. The transplanted tendon is not placed in a tendon sheath, but for the greater part of its course lies subcutaneously. It is fixed in its new position by means of a kangaroo fixation suture which is herring-boned through the end of the tendon. Operations of this kind must be carried out with care, avoiding trauma and exposure of the tendon to the air and with as little handling as possible.

Removal of Loose Bodies from the Posterior Compartment of the Knee-Joint.

M. S. Henderson (*Surgery, Gynecology and Obstetrics*, December, 1921) describes a method of approaching the knee-joint for the removal of loose bodies from the posterior compartment. A tourniquet is applied and the patient's knee is flexed to a right angle so as to relax the posterior part of the capsule. The incision is made on the lateral aspect of the knee in the long axis of the limb, just anterior to the position of the head of the fibula and the tendon of the biceps. If loose bodies are on the medial side of the joint a similar incision may be made on the postero-medial side anterior to the tendons of the semi-membranosus, sartorious, gracilis and semi-tendinosus muscle. Fixation in plaster of Paris for twenty-four or forty-eight hours prevents bleeding which may be caused by the involuntary movement of the patient recovering from anæsthesia.

The Treatment of Hip-Joint Disease.

JOHN E. FISH (*Surgery, Gynecology and Obstetrics*, January, 1922) has had an opportunity of observing and treating one hundred and seventy-five children suffering from hip-joint disease during a period of thirteen years since the Massachusetts Hospital School was established. In a large number of instances the treatment which had been already in progress, was continued, but after a time this was found to be impracticable because, as in the case of plaster of Paris fixation, complications were often discovered when the splint was removed. It soon became apparent that a complete physical examination was necessary on admission. As a routine treatment the patienets were put to bed and traction by means of weights and pulleys was used. This was followed by the application of the abduction splint as designed by E. H. Bradford. This method yielded very pleasing results and is considered by the author to be very much superior to any of the methods by which the patients were being treated upon admission.

MORPHOLOGY.

Experimental Lesions of the Auriculo-Ventricular Bundle.

FRED. M. SMITH (*Archives of Internal Medicine*, October, 1921), working at the Medical Department of Rush Medical College and the Presbyterian Hospital, records further observations on experimental lesions of the auriculo-ventricular bundle of the dog. Complete division of the right or left branches results in characteristic naked-eye changes in the contraction of the heart, the ventricles apparently not contracting synchronously. Characteristic electro-cardiographic changes, which are diagnostic of the lesion, also occur. In right branch block there is a marked *S* wave, followed by a position *T* deflection in leads II. and III., the *Q R S* group being prolonged. Transient block of right branch by pressure for a few seconds gives a similar variation. Characteristic of block of the left branch is an aberrant positive wave in all leads, followed by a negative *T* deflection. These electro-cardiographic changes, which in the dog are diagnostic of the lesion, do not always appear to hold good in man. It is probable that in some instances the discrepancy is due to anatomical differences in the intra-ventricular conducting system of man and of the dog. Division of the smaller ramifications of the left branch, even though extensive or of one or more of the main subdivisions, caused no alteration in the *Q R S* group. In two of the experiments the impulse reached all parts of the left ventricle in normal time, when only one main subdivision had apparently been left intact. In some of these experiments the electro-cardiogram was changed to an atypical form by ligature of branches of the left coronary artery. In four experiments the curves returned to normal as soon as the ligatures were removed. This change in the electro-cardiogram was produced as often as four times in one of the experiments. The author concludes that this fact would seem to indicate that functional changes in the myocardium may influence the transmission of the impulse within the ventricles.

The Time of Human Gestation.

JAMES OLIVER (*Edinburgh Medical Journal*, April, 1921) writes a brief criticism of the method of reckoning the age of a human embryo and of assigning dates to the various stages of embryonic development, from the date of cessation of the last menstrual period. The method is referred to as avowedly unsound and unscientific. It is very generally admitted that fertilization may occur at any time during the inter-menstrual resting period up to two days prior to the date of the next menstruation. In anticipation of this latter and as a preparation for it, there is an increased determination of blood to the internal organs of generation. It is evident that, as in the case of the vegetable seed and the bird's egg, fertilization endows the human ovum with the power of evolutional life, but does not start life. Consequently, fertilization and the beginning of gestation are not coetaneous phenomena. Evolutional life is started, not by intrinsic, but by extrinsic conditions and one of the most important of these is an abundant supply of free oxygen. During the inter-menstrual period the oxidative processes and powers of the uterus are merely sufficient for the requirements of this organ itself. In anticipation of and as a preparation for menstruation the oxidative processes and powers of the internal organs of generation become enormously increased. If a fertilized ovum should chance to be present it is at this time that it is fanned into life. Gestation thus begins at a fixed time and it is because of this that it is possible to forecast with some degree of accuracy the date of birth of an expected infant in the greater number of women who have a regular menstrual cycle of twenty-four to twenty-eight days. In those women whose range of menstruation is from thirty-one up to forty-two days, it is futile to base calculations of the duration of gestation from the cessation of the last menstrual period.

Origin of the Jaw Apparatus.

HAROLD AYRES (*Journal of Comparative Neurology*, October 15, 1921) discusses the current theory of origin of the jaws of vertebrates and their assumed descent from a pair of gills. As a result of careful dissection of various lower chordates, he maintains that this view is incorrect. The alimentary canal ante-dated gills, which were mere appendages in its wall, and the armature of the anterior opening of the alimentary canal ante-dated the highly specialized gills of vertebrates. All the evidence indicates that the jaws are in no way genetically related to branchial structures of any kind. The jaw apparatus of *Amphioxus* (lancelet) consists of two curved bars of cartilage controlled by a special set of muscles which can open and close the anterior opening of the alimentary canal. In *Ammoœtes* (larval stage of lamprey) and *Bdellostoma* (hag fish) successive modifications of the amphioxine jaw apparatus are seen, together with an added ventral element, which is the precursor of the hyoid apparatus. *Callorhynchus* and *Chimæma* (king of the herrings) serve to bridge the gap between these and the accepted *Gnathostomes*. The lower jaw or mandible is the first part of the biting jaws to be established. The maxillary structures arise in response to the stresses and pressure developed. The hyoidean apparatus appears as a supporting structure much before the appearance of the maxillary elements. The jaw is the end organ of the trigeminal nerve. In *Amphioxus* the trigeminal nerve originates as a group of five segmental nerves which innervate the mandibular apparatus. These, in higher groups, are condensed into one nerve, but in *Bdellostoma* the five ancestral nerves which comprise it, can still be distinguished.

The Heart in Experimental Hyperthyreoidism.

K. HOSHIMOTO (*Endocrinology*, September, 1921) presents a report as to the results of his experiments concerning the histological changes in the heart resulting from artificial hyperthyreoidism. He finds that buccal administration of toxic doses of thyreoid substance caused, in addition to an enlargement of the heart, the appearance of myocarditic lesions in very many instances. These changes consisted chiefly of dense accumulations of large "histiocytase" cells derived from the clasmocytes present in the interstitial connective tissue, in small circumscribed areas between muscle fibres or not infrequently in the neighbourhood of the blood vessels. These cells may be accompanied by a lymphocytic exudate in the earlier stages, while in later stages they are associated with fibroblasts which gradually increase in number and eventually prevail over other types of cells. Muscle fibres may thus be destroyed in areas adjoining. These cells may also show diffuse degenerative changes occurring independently of these interstitial changes, together with slight disintegration of their nuclei. Hearts showing such changes are functionally inferior to normal hearts and these changes are attributed directly to thyreoid intoxication. Thus thyreoid administration can cause not only tachycardia or hypertrophy, but also myocarditic lesions. All of these simulate the functional and anatomical changes found in the hearts of patients suffering from goitre. The evidence presented lends support to the theory that the cardiac disturbances associated with goitre are due to thyreoid intoxication.

British Medical Association News.

SCIENTIFIC.

A meeting of the Victorian Branch of the British Medical Association was held at the Walter and Eliza Hall Hall, Melbourne Hospital, on March 1, 1922, Dr. J. Gordon, the President, in the chair.

Malignant Disease.

Dr. T. Cherry read a paper entitled "A Theory of Cancer" (see page 425).

Dr. L. J. Clendinnen read a paper on "The Possibilities of Irradiation in Malignant Disease" (see page 456).

Dr. W. J. Penfold presented a contribution to the discussion on the causation of cancer (see page 460).

Dr. R. J. Bull said that, although the hour was too late to do justice in discussion to the papers, he wished to express his appreciation of them. Dr. Cherry's, he thought, tended to create a feeling of despair in its survey of the problem of malignant disease, while Dr. Clendinnen's offered a ray of hope. If, as was implied in the former, the concomitants of civilization were to be combated, the prospect seemed indeed hopeless.

He was not quite clear on one point brought out by Dr. Cherry. If a cold climate were one of the contributing factors to a high incidence of malignant disease, how did it come about that the Esquimaux rate was approximately the same as that obtaining in the tropics, *i.e.*, at the lower end of the scale?

He had been impressed with the immense amount of work and close study revealed in Dr. Cherry's paper, the purport of which was to expound and support an interesting theory of the origin of the malignant process, a theory based on biological, biochemical and immunological phenomena.

Dr. H. Flecker, referring to the paper read by Dr. Clendinnen, detailed briefly the histories of two patients in whom a good result was achieved by deep radio-therapy.

The first patient was a girl, aged fourteen, referred for X-ray treatment for an osteo-sarcoma of the femur, demonstrated as such histologically, which it had been decided was inoperable. Treatment by X-rays had been instituted and shortly afterwards the patient had sustained a spontaneous fracture of the femur. The limb had been placed in appropriate splints and after an interval X-ray treatment had been resumed. Secondary nodules even had appeared in the occipital and frontal bones, but as the result of perseverance with the irradiations these had disappeared. Union had been obtained at the site of the fracture and the girl, who had been abandoned surgically, was apparently cured.

In the second instance a woman undergoing post-operative X-ray treatment by reason of malignant disease of the breast, had developed severe pain in the back. By radiographic examination secondary deposits had been demonstrated in the vertebræ with the destruction of one. Although at this stage the patient was bedridden and in much pain, she had eventually been able to go home and a year afterwards had exhibited no signs of recurrence.

Dr. Flecker said that he quoted these two examples of successful X-ray treatment of malignant disease, not as typifying the usual result, but as showing the possibilities in the radio-therapy of cancer. Both patients had been treated with rays of the penetrative power supplied by a spark of twenty-five centimetres and there was reason to anticipate that the much more highly penetrative rays emitted by a fifty-centimetre spark would be still more efficient in treatment.

Dr. Ivan Maxwell said in reference to the remarks of Dr. Penfold upon the selective affinity for the cells of the bladder epithelium exhibited by aniline, that it was to be remembered that the concentration of aniline in the bladder was higher than elsewhere. Aniline was excreted by the kidney and remained in contact with the bladder epithelium for some time and in much greater concentration than it occurred in the blood, lymphatic vessels and tissues.

Dr. Penfold pointed out that aniline entered the body through the lungs and that it was in those organs that it was to be found in the greatest concentration. Aniline was not excreted as such by the kidneys, except when it was taken in very large quantities.

Dr. C. E. Dennis mentioned that since the installation of a new X-ray plant at the Alfred Hospital and the provision thereby of higher voltage and a longer spark than was formerly obtainable, a distinct improvement in the results of the treatment of malignant disease had been noted.

Dr. R. R. Stawell said that, although he entered the discussion of such a vast, difficult and uncertain subject as cancer with much hesitation, he felt no hesitation whatever in expressing his appreciation of the admirable study put before them by his old fellow-student, Dr. Cherry. The views of Dr. Cherry, based on careful inquiry and illuminated by his own imagination, had impressed him very much, as had also Dr. Cherry's extraordinary grasp of illustration and his amazing wealth of statistics, drawn not only from Europe, but from the whole world.

As far as his own thinking had taken him on the subject, Dr. Stawell said that he viewed organized growth as the product of active proliferation on the one hand and some normal restraint on the other. He had been inclined to look upon malignant processes as dependent on the withdrawal or diminution of the normal restraint, but Dr. Cherry had suggested in a stimulating way that cancerous change was an actual over-growth and not merely the result of a diminished restraint.

He thought with Dr. Bull that the broad problem of causation was beyond the control of this generation, but the work of Dr. Cherry might point the way to successful prevention in the future.

Dr. Sydney Pern referred to the work recently published by Ford Robertson, bearing on the rôle of aerobic and anaerobic diphtheroids in the production of mouse cancer.

It was generally conceded that persistent irritation was a very important factor in the pathogenesis of malignant disease. Why should not the irritative process be of the nature of a bacterial infection? As long as the bacteria in a granuloma remained active, the granuloma would grow. If the bacteria were destroyed, the granuloma would recede. In the inflammatory process as usually observed the cell response was limited, because the defensive mechanisms of the body were still in working order, but it was conceivable that bacteria, especially when lodged in a tissue for which they manifested a selective action—as did occur—might initiate an unrestrained proliferation of the cells of the particular tissue.

Such a result must ensue in the event of the failure of the defensive mechanism of the body to destroy the infecting organism. The ultimate result was death, which always occurred when an organism overwhelmed the host.

Dr. Pern instanced an infected gall bladder, eventually becoming malignant. The only difference between the two states was that in the latter the defensive mechanism had broken down. It would be extremely difficult to produce malignant disease experimentally in like manner because in the animals employed the defensive mechanisms were in full vigour.

There was no reason to assume that the supervention of malignant disease on infection by any of the ordinary infective organisms was impossible.

Dr. H. B. Lee remarked that he had been interested to note that the two papers, one propounding a theory of the causation of cancer and the other pointing the way to cure by radio-therapy, merged into one another in one respect.

Dr. Cherry had endeavoured to show that there was a relation between latitude and the incidence of cancer and that as the equator was approached, the cancer rate fell. Might this observation not be connected with a beneficial effect of the radiant energy of the sun, of which the tropical races secured the maximum, by dispensing with the clothes adopted by the peoples of temperate and colder regions.

Dr. Cherry, in reply, said that he would confine his remarks to two points.

Dr. Penfold had asked why it had been necessary to

postulate the action of two substances, "proliferin" and an activator. This phase of his theory he had based on experimental investigations into the manner in which pigment was formed in melanotic sarcoma and in melanosis generally. In that instance at least the participation of two substances was not theory but established fact.

With reference to Dr. Bull's query about the Esquimaux and the low cancer rate among these people, although they lived in a frigid climate, Dr. Cherry said that the Esquimaux were uncivilized; they kept themselves very hot in their furs and ill-ventilated huts and they were notorious for over-eating. These habits neutralized the effect of cold.

In replying to the expressions of thanks, Dr. Cherry said that in his attempt to elucidate the cause of cancer he had endeavoured to make use of known physiological forces and perhaps this was a step in the right direction.

NOTICES.

THE COUNCIL OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION has arranged the following provisional programme of the Branch. The Scientific Committee reserves to itself the right to modify the arrangements, but it is hoped that no changes will be necessary.

May 3, 1922.

At the Walter and Eliza Hall Institute, Melbourne Hospital, at 8.30 p.m..

DR. E. H. DERRICK: "Renal Tumours."

DR. JULIAN SMITH: "Diagnosis of Renal Tumours."

DR. H. ALAN S. NEWTON: "Treatment of Renal Tumours."

June 7, 1922.

At the Walter and Eliza Hall Institute, Melbourne Hospital, at 8.15 p.m..

DR. W. J. PENFOLD will demonstrate the action of pneumococci on aromatic amino bodies.

DR. W. J. PENFOLD: "Australian Pneumococci."

DR. S. W. PATTERSON: (*a*) "Prognosis in Pneumonia"; (*b*) "Clinical Application of Serum Treatment of Pneumonia."

DR. R. L. FORSYTH will open the discussion on the serum treatment of pneumonia from clinical experience at the Children's Hospital. Papers will be illustrated by lantern slides.

July 5, 1922.

At the Alfred Hospital.

A CLINICAL MEETING will be held, of which the details will be announced later.

NOMINATIONS AND ELECTIONS.

THE undermentioned has been nominated for election as a member of the New South Wales Branch of the British Medical Association:

SHEPPARD, EDMUND MACARTHUR, M.B., Ch.M., 1920 (Univ. Sydney), c.o. University Club, Sydney.

THE FACULTY OF MEDICINE OF PARIS.

THE FACULTY OF MEDICINE OF PARIS have arranged to hold two annual post-graduate courses in the dermatological and syphilographic clinics of the Hôpital St. Louis, under the direction of PROFESSOR JEANSELME. The course will take place in October, November and December and in April, May and June. The next course will begin on October 9, 1922. Subsequent courses will begin on the second Monday in April and the second Monday in October. The entrance fee for the complete courses in dermatology and venereology is 150 francs. A full syllabus will be forwarded on application to M. MARCEL CLOCH, Chef de Laboratoire à la Faculté, 40, Rue Bichat (X°), Hôpital Saint Louis, Paris.

Public Health.

THE HEALTH OF QUEENSLAND.

THE annual report of the Commissioner of Public Health of Queensland, Dr. J. I. Moore, for the twelve months ended June 30, 1920, has been made available. Even more than most annual reports, this one resembles the constellation of the Scorpion in having a small head, represented by the actual report, and a preternaturally long tail in the shape of appendices. The former runs to three and a half and the latter to nineteen pages.

Statistics.

The estimated population of Queensland for the year 1919 was 725,220, an increase of 30,780 on the figures for the previous year, which is equivalent to 4.43% of the population. The crude birth-rate for the year 1919 was 26.23‰, as compared with 28.41‰ in 1918 and 29.05‰ in 1917. This fall is not limited to Queensland, as other States unfortunately show a declining birth-rate. Queensland still has the highest birth-rate of all the States. The death-rate rose from 10.40‰ in 1918 to 12.43‰ in 1919. A similar rise occurred in all the States and is attributed to the influenza epidemic which attacked us in the year under review. The infantile mortality showed an alarming increase, from 56.9‰ to 72.4‰. From having the second lowest mortality of infants in 1918, Queensland found herself in 1919 in the unenviable position of having the highest of all the States. The Commissioner dismisses the consideration of this increase with five lines, in which he states that it was "largely attributable to the visitation of influenza to Australia, which naturally impaired the health of both mothers and infants." But, with the possible exception of New South Wales, none of the other States which were similarly visited by influenza, showed such an enormous increase. Victoria, for example, had an infantile mortality of 61.7‰ in 1918 and 68.0‰ in 1919. A detailed study of the causes of the increase would have been welcomed. No subject is of more importance to the nation than the health and lives of its infants and the causes of any material increase in infantile mortality should be thoroughly investigated.

Infective Diseases.

Dr. Moore states hopefully that the increase of notifiable diseases which occurred during the year, does not call for serious comment and in the same sentence we are informed that there was an increase of 745 cases of diphtheria, 123 of typhoid fever and 24 of scarlet fever. We regard the increase in diphtheria as calling for very serious comment. As a matter of fact, the figure quoted by Dr. Moore does not tally with the figure shown in the table he supplies. According to the latter, the increase was 472 and not 745. Either Dr. Moore's larger figure is incorrect or there is an error in the tabulated figures. Taking the lower estimate, an increase of 472 cases is an indication of the failure of preventive measures. The Commissioner attributes a proportion of the blame to the local authorities, who have neglected to carry out the health regulations in their entirety, but he fails to describe the means by which he attempted to reduce the incidence of the disease.

More cases of influenza were notified than of any other disease. In the Brisbane metropolitan area, 1,483 cases were notified in 1919-1920, as compared with 9,570 in 1918-1919, but for outside areas the respective figures were 17,319 and 11,099. The Commissioner's contribution to the discussion of this epidemic is "that it may be regarded as the remnant of the 1919 epidemic outbreak; recent cases show no serious symptoms." It would be interesting to know how many of this "remnant" (18,802 patients) died, how many suffered from serious pulmonary mischief and how many had mild attacks of the disease. It would also be of interest to know what fresh arrangements were made for their treatment or whether the means described in the previous report were again used. For this and other information we have searched the report in vain.

The number of notifications of pulmonary tuberculosis (in the report the inaccurate and unkindly designation

"phthisis" is used) fell from 410, the figure for the previous twelve months, to 374. A visiting nurse is employed by the Department, whose duty it is to visit the homes of infected persons and give them and their immediate relatives advice and assistance in the disposal of sputum and other hygienic measures. The nurse visited the homes of 276 persons during the year, 174 of whom were visited and advised for the first time. It would be well if each State appointed a number of nurses to carry out this admirable work. An unusual degree, however, of patience, common sense and tact is required for this work. We have known a great deal of harm and deplorable recrimination to follow the statements and actions of an indiscreet nurse in a tuberculous patient's home. The report mentions the existence of a sanatorium at Dalby. No description of the work of this institution is supplied. A short report by Dr. A. Stewart, part-time medical officer of the Central Tuberculosis Bureau, states that "100 cases were examined for institutional treatment and that of these 57 were found suitable for the sanatorium and the remaining 43 were referred to the Diamantina Hospital." The out-patients attending the Bureau numbered 175 and there were 256 consultations. These figures do not suggest that the Bureau has the scope of a well-organized tuberculosis dispensary. The Bureau is apparently more an examining and drafting depôt for candidates for sanatoria than an out-patient dispensary. The problem of tuberculosis is so important that we regret that fuller details of the attack on the disease in Queensland are not given. As no information is given regarding Dalby Sanatorium, it is impossible either to appreciate or to criticize the work done at that institution.

Venereal disease boasts more detailed mention than tuberculosis. In the twelve months under review, 2,848 cases of venereal infection were notified, an increase of 845 on the previous year. These cases included 2,254 of gonorrhœa, 351 of primary syphilis, 79 of secondary syphilis, 151 of soft chancre, two of ulcerative granuloma and eleven of venereal warts. The total number of patients, however, was 2,828, as fifteen cases were notified as gonorrhœa and syphilis, four as gonorrhœa and chancre and one as syphilis and chancre (*sic*). More than half of the infected persons were between 20 and 30 years of age. Approximately 700 prostitutes were examined and 67 were detained for treatment in hospitals. On December 8, 1919, the clinic for the treatment of male patients was removed from the Brisbane General Hospital to the Health Department, Hope Street, South Brisbane, and the services of a full-time medical officer were engaged. The clinic is open for treatment each morning, afternoon and evening from Monday to Saturday inclusive of each week and each Sunday morning. On April 13, 1920, another clinic for males was opened in William Street, Brisbane, where patients are treated on two evenings in each week. At these clinics 843 patients were treated, 594 of whom suffered from gonorrhœa and 119 from primary and secondary syphilis. It is interesting to read that nine prostitutes were prosecuted for failure to attend for examination and fines were inflicted totalling £45 19s.. The Queensland practice of fining prostitutes is one of doubtful utility. It should certainly stimulate them to ply their trade with added vigour, in order that the fines might be paid. Warning letters were dispatched to 400 persons who had discontinued treatment before being certified as cured. The assistance of the police was sought in regard to 151 of these persons. Of these, 45 could not be traced, 28 had resumed treatment, 32 had been certified as cured and the remaining 46 could not be classified at the time of writing of the report.

The Hookworm Campaign.

A short paragraph is devoted to the activities of the Hookworm Campaign. Readers are already conversant with the excellent work done by this organization.

Laboratory of Microbiology and Pathology.

No information of practical importance is published concerning the work done in the Laboratory of Microbiology and Pathology. There were over 41,000 examinations during the year, as compared with 29,000 during the preceding years. This increase is due principally to efforts made to diagnose enteric fever and diphtheria by pathological and bacteriological examination. Dr. H. E. Brown, the Assistant Bacteriologist, reports in regard to diphtheria that all swabs "negative" after twenty-four hours' incubation are re-examined and of these between 2% and 3% are found to be "positive."

Leper Lazaret, Peel Island.

On July 1, 1919, there were 41 lepers in the lazaret. During the year three white males and five coloured males were admitted and three males were discharged. One white male patient and two coloured male patients died. On June 30, 1920, there were 43 inmates of the lazaret, 35 males, of whom 16 were white, and 8 females, 7 of whom were white. The report states that the medical men at a certain centre at which cases of leprosy had from time to time occurred, expressed the opinion that the disease was due to the infectivity of a particular area of the town, where the premises were old and dilapidated. Many of these houses were condemned, demolished and burnt.

Foods and Drugs.

The Commissioner expresses satisfaction with the work done during the year in regard to foods and drugs. A list of prosecutions against milk vendors for adulteration of milk is appended. The added water varied from 4% to 32% and the fines imposed from £1 to £40. Curiously enough, the milkman whose milk contained 32% of added water was fined only £5.

New Poisons Regulations came into force on April 1, 1920. No definite information is given in regard to these Regulations in the report, but it is stated that all poisons must now be so stored and retailed as to eliminate any risk of accidental poisoning.

THE PLAGUE OUTBREAK.

THE following information has been culled from Bulletins Nos. 32, 33, 34, 35, 36 and 37 dealing with plague in Australia which have been issued by the Federal Department of Health between February 24 and March 31, 1922:

General.

Appended to Bulletin No. 32 is a summary of the legislative measures taken in the several States in connexion with the endeavour to control the outbreak of plague.

In New South Wales an Act amending the *Public Health Act* came into force on December 17, 1921. The provisions of this Act enabled the authorities to introduce regulations covering the recommendations of the conference. These regulations came into force on February 8, 1922. They have been drafted for the purpose of eradicating rats and mice and insects capable of carrying plague in public and private premises and of instituting rat-proofing of buildings, docks, wharves, embankments and other structures.

Regulations dealing with the prevention and destruction of rat fleas and other plague-carrying insects were gazetted in Queensland on December 3, 1921. The measures required to be taken under these regulations are imposed in part on owners and occupiers of premises and in part on the local authorities. The regulations were amended on January 19, 1922, to bring them into line with the recommendations of the conference. The *Epidemic Diseases Regulations, 1921* (Queensland), deal with house-to-house inspection and clothe health officers or authorized medical practitioners with power to take action in the presence of plague or suspected plague. A further set of regulations in Queensland have been adopted for the control of goods traffic. An order was issued during the latter end of the year 1921 for the formation of a Board called the Metropolitan Joint Health Board. This Board is charged with the superintendence, execution and enforcement of the *Rat Flea and Plague Carrying Insects Prevention and Destruction Regulations* within the City of Brisbane and its suburbs. Outside the area controlled by the Board

the same duties are carried out by health officers appointed under the *Health Acts*.

A set of plague regulations were issued in Victoria on January 11, 1922. The regulations provide for the notification of infection, the isolation of patients, the control of contacts and the disinfection of premises.

In Western Australia the model regulations approved by the members of the conference were adopted by the health authorities. Each local authority has been required to adopt these regulations.

Plague in Man.

During the period from February 11 to March 11 no persons were admitted to the Wattlebrae Isolation Hospital, Brisbane, on account of plague or suspected plague. On the latter date a girl, aged nineteen years, was admitted and at first some doubt existed concerning the nature of her disease. Later it was determined that the illness was not plague. On March 14 a boy, aged twelve years, was found to be suffering from plague. He had been admitted to the Brisbane General Hospital on March 8 and had been transferred to Wattlebrae on March 13. Bacilli were recovered from the bubo on the following day. The source of infection was unknown. On March 24 a man, aged thirty-two years, was admitted to the Isolation Hospital, but the diagnosis of plague had not been confirmed up to the time of the issue of Bulletin No. 37.

In Bundaberg a woman, aged 52 years, was taken ill on February 25 with headache and pains in the back. A bubo developed in the right femoral region. She was removed to hospital on February 28. On March 2 bacteriological evidence of plague was obtained and on March 7 the patient died. It is held that this patient had become infected in Brisbane or on before February 23, 1922.

About March 11, 1922, an aboriginal woman was taken ill at a station thirty-five miles from Aramac. Smears were taken, but no plague bacilli were recognized. The patient died on March 18 and death was ascribed to plague. It was thought that the patient had been infected in Rockhampton, where plague rats had been found at intervals. No other plague infections in human beings were recorded during the period under review in Queensland.

On February 20, 1922, it was reported that two persons were suffering from plague in Sydney. One was employed at a produce store in Oxford Street, Paddington, and the other at a drapery establishment in Liverpool Street. No further plague infections in man occurred in Sydney until March 11, when two notifications were received. The patients were a married woman, aged twenty-seven years, and a young man, aged seventeen. The infection in both instances occurred in Oxford Street, Paddington. On March 22 a man, aged thirty years, died of septicæmic plague. He had been admitted to the Sydney Hospital two days previously. The infection was traced to livery stables in Woolloomooloo. On March 28 it was reported that a girl, aged seven years, had been admitted to the Coast Hospital from Dowling Street, Woolloomooloo, on account of suspected plague. The diagnosis was confirmed bacteriologically. Four further notifications were received on March 31, 1922. Two of the patients resided in Woolloomooloo and one in Alexandria.

No further plague in human beings occurred in any other part of Australia.

Plague in Rodents.

During the six weeks ended March 25, 1922, a very large number of rats and mice were destroyed and examined for plague infection throughout the State of Queensland. Only six infected rodents were found. It appears that no plague rats were caught after the end of February.

Systematic rat destruction and examination were carried out in Sydney. The result was the detection of twenty-five infected rodents and two infected cats. The spread of the epizootic was carefully followed and the information obtained from this study was utilized in connexion with the administrative measures for the control of the outbreak.

Information is also given concerning the work of destroying rats and searching for signs of an epizootic in other States of the Commonwealth.

Special Correspondence.

LONDON LETTER.

BY OUR SPECIAL LONDON CORRESPONDENT.

Medical Services Under the Insurance Act.

Two inquiries which have been recently held regarding the range of medical service under the *Insurance Act*, have revealed the somewhat curious spectacle of local medical committees endeavouring to exclude the performance of certain comparatively simple operations from the services to which insured persons are entitled as part of the medical benefit, from practitioners of ordinary degree of competence and skill. In the first case, operations for hæmorrhoids and for a large cyst near the knee had been performed by a London panel doctor; the local medical committee, contending that these were operations such as could not be safely undertaken by the practitioner of average competence and skill, advised against sanction of the statutory payments for the administration of a general anæsthetic by the doctor's partner. Their view was upheld by the Insurance Committee, but as a result of an appeal by the practitioner an inquiry was held by a court of referees appointed by the Minister of Health. Counsel and solicitors attended to take the evidence of the practitioner and of several consulting surgeons and other expert witnesses. In the end the operation for hæmorrhoids was pronounced to be outside the scope of the services contemplated in the Act, but the anæsthetists's fee in the case of the removal of the cyst was allowed.

The second case was that of an insured person living in Leicestershire who had consulted his panel doctor with regard to a non-malignant, warty tumour, the size of a jargonelle pear, at the back of his neck. The doctor suggested hospital treatment, but the patient, not desiring this, requested him to charge a fee and himself undertake the operation. This was done under local anæsthesia, one guinea being charged. The Insurance Committee declared that the operation was one which, consistently with the interests of the patient, could be properly undertaken by a practitioner of ordinary professional competence and skill and which therefore came within the scope of the *Insurance Act*. The local medical committee dissented, pointing out that locally two practitioners only out of twelve were in the habit of performing similar operations. In the end the court upheld the view taken by the Insurance Committee and no doubt the guinea has been returned. Having regard to the differing conditions obtaining on one hand in rural and semi-rural areas (where the practitioner of necessity has to undertake much surgical work) and on the other in London and the large towns (where the panel doctor is frequently too much occupied in prescribing for his panel patients' coryzas to have time to treat their surgical ailments and has several hospitals comparatively near his door) one may conclude that these decisions are fair; but the machinery by which they were reached is cumbrous. Generally speaking, panel practitioners will agree with the remark of the Leicestershire Court that it is not only inadvisable but impossible to attempt a formal classification of operations which might or might not be within the range of "medical service"; no general *index expurgatorius* can be made, but each case must be decided on its merit—for which a solemn and elaborate conclave unfortunately appears to be necessary.

Some Defects in the Machinery of the Insurance Act.

When one turns to another inquiry recently made by the Ministry of Health, one is a little irritated by the official little-mindedness which the facts reveal. A panel doctor was surcharged £15 for excessive prescribing and appealed to the Ministry. The average cost of his prescriptions per person amounted to 1s. as compared with an average for the area of 9d. and his average frequency of prescription was 3.5 per insured person as compared with 3.2 among all the doctors of the area, so that his average cost of prescriptions per insured person came to 3s. 6½d.. The doctor pointed out that he had a small panel

of 293, of whom 188 were treated during the year, and that the statistical findings from such a small group might well show departures from the law of averages. His appeal was allowed.

It is true that since the *Insurance Act* came into force there have been indubitable although extremely rare instances wherein panel practitioners, possibly owing to a dislike of the Act and of Mr. Lloyd George's methods in introducing it, have been shown deliberately to have given excessively costly prescriptions; but in the case under review the circumstances were very different. One is driven to conclude that the exercise of a little common sense might have averted a costly inquiry, the public report of which is little calculated to increase the valuation which the working man or woman places on the medical services which he receives under the *Insurance Act*.

The Orthopædic Hospital, Shepherd's Bush.

Most of the doctors who served during the late war, are conversant with the excellent work done since 1916 at the Pensions Orthopædic Hospital at Shepherd's Bush, which during last year treated as in-patient's 4,000 officers and men and gave 150,000 out-patient consultations. Before renewing the expiring lease of the premises, the local Board of Guardians demanded from the Minister of Pensions an increase of rent which he regarded as exorbitant and accordingly it is proposed to divert the in-patient department to a much less convenient and central site at Richmond and to divorce it from the out-patient side. In letters to the press and interviews the medical staff have pointed out that this would seriously diminish the efficiency of the hospital, that the patients would lose in every way by the change and that the development of orthopædic surgery would be impeded. On the one hand, the Guardians are not unnaturally mindful of their rates and of the cry for economy; on the other hand, the Minister of Pensions declines to be "blackmailed." An unfortunate situation has arisen and one which threatens to bring suffering particularly to the crippled ex-service men whose cause should surely be placed beyond all jeopardy from administrative friction. It is earnestly hoped that a way out will be speedily found, possibly by arbitration, as suggested in *The Times* by one of the medical staff.

Correspondence.

RESEARCH IN TROPICAL AUSTRALIA.

Sir: In The Medical Journal of Australia of December 3, 1921, is a leading article on tropical medicine, pleading for further expenditure of public money on research in tropical medicine in Australia, which calls for comment.

Dengue fever, anchylostomiasis, amœbic dysentery and beri-beri are quoted as "sufficiently common to merit serious attention." Of these, dengue fever occurs in Queensland as elsewhere in wide-spread epidemics at irregular intervals and is quite absent in the intervening periods. No doubt intensive study of one or more epidemics would produce valuable results, but the disease does not lend itself to long and continuous investigation, on account of its irregular occurrence.

Anchylostomiasis is being dealt with by the special organization of the Rockefeller Foundation.

Amœbic dysentery is undoubtedly very rare and therefore of no real economic importance. It is unlikely that the study of the few cases that do occur would add anything to existing knowledge of the disease.

Beri-beri is found from time to time in the sparsely populated inland areas, where difficulties of transport and agriculture make the regular supply of fresh food impossible. The cases are scattered over so many miles of country that it would be impossible to study them closely or to gain any information at all comparable to already known facts. There is also a little beri-beri in the pearling fleets, but to work on these cases would necessitate a man living continuously at either Darwin, Thursday Island or Broome for many years before he would see a hundred or two of these cases. It would be better to apply knowledge gained elsewhere than to waste time and money on research foredoomed to failure because of the paucity and inaccessibility of available material. Here, indeed, in my opinion, is the crux of the whole matter of research in Australia on human tropical diseases. The population where such diseases are found, is small and scattered over many miles of country, hence the opportunities of studying the diseases in question are so few that the chances of producing any information of value from them are negligible. In modern research the first essential is ample material; this Australia can never supply until the population is greatly increased.

I agree that the scope of the workers at the Tropical Institute should be widened. In the past the work there has been confined by authorities in the south—none of them tropical experts—to the investigation of human diseases. There are many problems in Northern Australia in urgent need of investigation, such as plant and stock diseases and the destruction of timber by white ants, which cost the country greater loss than does human tropical disease. These could well be investigated at the Institute.

"Better and more modern equipment" is asked for the Institute. The equipment at present there is ample and quite modern enough with which to turn out good work. Many laboratories elsewhere doing valuable work have apparatus no better and often not so good. In fact, the Liverpool School of Tropical Medicine has apparatus not so varied and certainly no more modern than that at Townsville. Moreover, the Institute possesses a scientific library of which it would be difficult to find the equal in any institution of a similar size in the world. It is in finding material on which to employ the apparatus that the difficulties lie.

It is suggested that the staff of the Institute should be given periods of service in southern laboratories "to prevent them from feeling the strain of continuous, intense work in a tropical environment." There is abundant evidence that physical strain is not felt, but there is undoubtedly great danger of mental deterioration, not from the climate, but by isolation from other people doing similar work. Leave is necessary, but not to visit southern laboratories, but those of Europe, where alone the necessary periodical "brushing up" of the staff can be given. It is stated that: "It is held by some that the northern areas of Australia offer no opportunities for the study of tropical disease." To a certain extent this is correct, but I would add "with any prospect of producing results of a value at all commensurate with the expenditure involved." No one would say absolutely that opportunities of research did not exist anywhere. There are potentialities for research wherever there is one individual liable to a cold in the head, but it would be difficult to find anyone who would finance an expensive laboratory and keep a trained staff standing by in case this solitary individual developed a cold. This is practically what the Government is urged to do at Townsville because of (*i.*) the policy of restricting the work of the Institute to human diseases alone and (*ii.*) the comparative freedom of Northern Australia from tropical diseases. With the possible exception of hookworm disease, which is being dealt with at the present time, none of the tropical diseases mentioned in the article under consideration, nor any of those omitted from it, are causing any hindrance to the settlement of tropical Australia, nor are any of them frequent enough to produce an appreciable economic loss to the country. Research into human diseases on a large scale in tropical Australia is an ideal, highly commendable in the abstract, but, like ideals in other walks of life, it must give way before the hard fact that it will not pay. In these days of enforced economy this is a very important consideration.

I would counsel a pause and careful consideration before the urgings of The Medical Journal of Australia are followed. They are, in brief, an attempt to resuscitate the dying Townsville Laboratory by the same methods which have caused its collapse. When I left Australia in July last the Institute was under the Federal Ministry of Health as a unit of that Department. In addition to controlling from Melbourne the work of the laboratory, the head of this department reserved the right of censorship over all scientific papers written by any member of the staff—a strange state of affairs in an institution whose objects are to determine scientific truths and one not calculated to produce the best results. A second disability was that, being part of a large Government department, it had to

conform to the routine of that department—a difficult matter for a research organization, on account of the necessarily irregular nature of the work of the staff. A third objection to the system is that, while no doubt highly capable in their own sphere of governmental methods of administration and the control of public health in a general way the chief executive officers of such a department have not, nor can they be expected to have, the knowledge or time at their disposal for the direction of a scientific laboratory, more especially when the laboratory is a long distance away. A first necessity for its future success is the removal of the Institute from the control of the Federal Ministry of Health. Then a Director of wide scientific knowledge and outlook should be appointed, who would be responsible to no one but a Minister of the Crown. He should be largely responsible for the appointment of his staff and for the nature of the work they were engaged on and he should, as far as Government methods of administration would permit, be left alone.

Meantime, as THE MEDICAL JOURNAL OF AUSTRALIA correctly points out, there is a large field for medical research in the island territories north and north-east of Australia. With their large native populations these islands offer an attractive field for the research worker. Therefore, let the advocates of medical research turn their eyes thither and cease for a time at any rate from trying to make poor tropical Australia appear a hot-bed of dread diseases for the purpose of trying to stimulate into ineffectual life a moribund institute. Seeing that the Government's two expensive research ventures on the mainland—the Tropical Institute and the Bureau of Science and Industry—have not been crowned with much success, it would be better to seek for the Pacific Islands laboratory privately endowed after the model of the Liverpool School. It should be possible to find merchants with trade interests in the Pacific as public-spirited as Sir Alfred Jones, of Liverpool, who could find the necessary money. The University of Sydney, from its geographical position, is obviously the most suitable body to control such a laboratory and once under University control it should not be taken over by the Government as the Townsville Institute was. The beginnings should be small and the young laboratory should gradually expand by continued effort and increasing production. This is a much sounder basis on which to found a lasting institution than to begin as a large, full-grown institution, like all things that have grown too fast, to inherent weakness, if not premature death.

Yours, etc.,

PHILIP A. MAPLESTONE,
Lecturer in Protozoology at the Liverpool School of Tropical Medicine; late Acting Director of the Australian Institute of Tropical Medicine.

Liverpool, England,
February, 1922.

VENEREAL DISEASES.

SIR: In connexion with the recent correspondence in your columns, the following propositions are suggested as being a necessary premise to any scheme for dealing with venereal disease:

1. In any scheme for the prevention or limitation of venereal disease, "moral" and sociological measures must be given a foremost place as constituting the most effective and essential means of true prevention. Much of the past and present failure is due to the dissociation or even antagonism between social and sanitary measures for prevention. Adequate control cannot be effected by legislative enactment concerned only with measures subsequent to infection actual or potential, still less by those designed to limit the possibilities of infection by the actually diseased. This is due specially to the following facts, *viz.*:

(1) That measures for avoiding infection under conditions of definite voluntary or involuntary exposure to risk are difficult of application and uncertain in operation.

(2) That especially in gonorrhœa the presence of infectivity cannot adequately be ascertaiend or controlled.

The bringing together for legislative purposes of such totally dissimilar diseases as syphilis and gonorrhœa, the only actual connexion between which is the social circumstances of their spread, is a distinct recognition of the above contention.

2. While it is recognized that promiscuous sexual intercourse (without which venereal disease would not exist) is in some degree inevitable and uncontrollable and that special measures of disease control are therefore necessary, it is held that the incidence of promiscuous intercourse is, to a considerable degree, amenable to social and communal conditions and influences must be taken into consideration as an essential part of preventive measures.

Among the influences and conditions adverse to successful control may be mentioned:

(*a*) Relaxation of the social and communal attitude towards promiscuous intercourse.

(*b*) Obscurity and a lack of exact knowledge on sex matters and venereal disease; and on the other hand general looseness and lack of reticence in the attitude towards them and laxity in social relations.

(*c*) The demand for excitement and pleasure at all costs, largely created by the unhealthy supply.

(*d*) Alcohol and prostitution.

(*e*) The national menace of concentration of populace in large towns, combined with the growth of industrialism.

(*f*) Consequent on (*c*) the growing up of conditions of overcrowding and slum life and lack of universally available and attractive opportunities for active recreation, especially sports, provision of which should be an important part of civic administration.

(*g*) Distaste for marriage; lack of impetus to high ideals of social life and citizenship.

All organizations, official or voluntary, such as religious organizations, health associations, town planning and infant welfare associations, rescue workers, associations of sanitary engineers, medical associations, etc., whose concern is social and civic order and elevation, when properly constituted and adequately informed, are great potential reservoirs of knowledge, information and active cooperation which should be utilized; therefore legislation should specifically arrange for cooperation with such bodies and should embody their expert knowledge. This might be done in various ways, of which the following are suggested:

(1) Medico-social clinics, as utilized in social service departments in America.

(2) The public health enactments should constitute statutory advisory commissions of experts from such bodies to assist in the working the Act by actual active cooperation and by educational efforts.

(3) Venereal disease legislation should constitute an honorary commission to watch the sociological side of the position. A special clause in the Act should make such a statutory appointment with defined powers and duties which should, broadly speaking, be designed to coordinate the social and "sanitary" ideas of preventive efforts.

No legislation involving intervention of the official health departments will be of any value which is not actively and intelilgently administered by an adequate staff and has not the cooperation of the medical profession and the community. The prevention of venereal disease is, as in all other preventible diseases, a matter of the price thought worth paying for it. In venereal diseases the price demanded of the community for freedom from disease is not primarily a financial but a social and individual one.

Yours, etc.,

A. GRAHAM BUTLER.
J. V. DUHIG.

Brisbane.

THE METRIC SYSTEM.

SIR: There are two main facts which hinder the adoption of the metric system in medical practice:

1. The training of the English or Australian youth has been based on English measures of length, volume, weight and temperature. The relatively small period given to the study of chemistry and physics cannot counter-balance this.

2. The measures of length, volume, weight and temperature in general use are of English calibration.

Analysing the difficulties confronting the practitioner

when he comes to use the metric system in prescribing a mixture, one finds the following stalwart band:

1. His own ingrained habits of thought. It is not easy for the average man, born and bred in an English community, actually to think in centimetres, mils and grammes. For many months, at least, he would find it necessary to go through the mental exercise of translating the English doses to metric before writing the prescription.

2. Habits of thought similarly impressed on the dispensing chemist. He must translate the metric prescription into English—inwardly cursing the while—before proceeding to measure his drugs. This translation process indulged in by the physician and the dispenser gives loopholes for grave errors, especially in dealing with minute doses of powerful drugs: $^1/_{200}$ grain hyoscine hydrobromide is more easy to comprehend than 0.0003 gramme.

Though it be granted that custom and practice will gradually overcome the difficulties arising from our English school training, there are these further inconveniences:

3. The calibration of the dispenser's measuring apparatus. This is English: the weights, the measure glasses, the bottle to be filled—all indicate ounces and drachms.

4. The measure glass used by the patient. When he does not use the nearest kitchen spoon, the patient measures his dose of health-infusing potion in a glass reading ounces and fractions of ounces. Of course, a general "scrapping" of English weights and measures might be instituted. Under present conditions, should the physician brace himself to write his prescription in accordance with metric ideas, his precise "15 mils" will be translated on the label to the homely "one tablespoonful." To avoid such clumsiness would require the dose being ordered as 10 cubic centimetres or a multitple of ten, mixture bottles of 100 cubic centimetres and multiples of a hundred and measure glasses showing 20 cubic centimetres by fives.

These difficulties are not insuperable, perhaps, but they are certainly real live difficulties—a stalwart band—and there's a deal of hard fighting to be done ere they surrender.

Yours, etc.,

A. R. SOUTHWOOD.

Adelaide, April 17, 1922.

FORTHCOMING CONGRESSES.

THE CONGRESS OF THE SOCIETÀ ITALIANA DI RADIOLOGIA MEDICA will be held at the Rizzoli Orthopædic Institute, Bologna, from May 9 to 11, 1922.

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THE ANNUAL FRENCH CONGRESS ON INTERNAL MEDICINE will be held in Paris in October, 1922.

Books Received.

THE MECHANICS OF THE DIGESTIVE TRACT, by Walter C. Alvarez, M.D.; 1922. New York: Paul B. Hoeber; Demy 8vo., pp. 192, with 22 illustrations. Price: $3.50 net.

THE PATHOLOGICAL GALL-BLADDER, by Arial W. George, M.D., and Ralph D. Leonard, M.D., being Volume Two of the Annals of Roentgenology, A Series of Monographic Atlases, edited by James T. Case, M.D.; 1922. New York: Paul B. Hoeber; Demy 4to., about 44 pages of letterpress in three languages (English, French and Spanish) and 44 full-page plates with descriptive legends. Price: $10.00 net.

MEDICAL PRACTICE IN OTAGO AND SOUTHLAND IN THE EARLY DAYS, by Robert Valpy Fulton, M.D. (Edin.); 1922. Dunedin, New Zealand: Otago Daily Times and Witness Newspapers Company, Limited; Demy 8vo., pp. 304, with numerous portraits and illustrations.

Medical Appointments.

THE undermentioned have been appointed Public Vaccinators in Victoria: DR. D. BICKART (B.M.A.) at Somerville; DR. W. I. HAYES (B.M.A.) at Heidelberg; DR. S. RABL (B.M.A.) at Murtoa.

* * * *

THE undermentioned have been appointed Government Medical Officers in New South Wales: DR. H. V. GILLIES (B.M.A.) at Coonamble; DR. R. S. R. MITCHELL (B.M.A.) at Gulargambone; DR. M. F. O'REILLY (B.M.A.) at Bega; DR. E. H. WHITE (B.M.A.) at Candelo; DR. W. F. S. YEATES (B.M.A.) at Ballina.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, 429, Strand, London, W.C.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney	Australian Natives' Association Ashfield and District Friendly Societies' Dispensary Balmain United Friendly Societies' Dispensary Friendly Society Lodges at Casino Leichhardt and Petersham Dispensary Manchester Unity Oddfellows' Medical Institute, Elizabeth Street, Sydney Marrickville United Friendly Societies' Dispensary North Sydney United Friendly Societies People's Prudential Benefit Society Phœnix Mutual Provident Society
VICTORIA: Honorary Secretary, Medical Society Hall, East Melbourne	All Institutes or Medical Dispensaries Australian Prudential Association Proprietary, Limited Manchester Unity Independent Order of Oddfellows Mutual National Provident Club National Provident Association
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane	Brisbane United Friendly Society Institute Hampden District Hospital Stannary Hills Hospital
SOUTH AUSTRALIA: Honorary Secretary, 3, North Terrace, Adelaide	Contract Practice Appointments at Renmark Contract Practice Appointments in South Australia
WESTERN AUSTRALIA: Honorary Secretary, 6, Bank of New South Wales Chambers, St. George's Terrace, Perth	All Contract Practice Appointments in Western Australia
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington	Friendly Society Lodges, Wellington, New Zealand

Diary for the Month.

MAY 3.—Victorian Branch, B.M.A.: Branch.
MAY 5.—Queensland Branch, B.M.A.: Branch.
MAY 9.—New South Wales Branch, B.M.A.: Ethics Committee.
MAY 10.—Western Australian Branch, B.M.A.: Council.
MAY 10.—Melbourne Pædiatric Society.
MAY 11.—Victorian Branch, B.M.A.: Council.
MAY 11.—City Medical Association, New South Wales.
MAY 12.—New South Wales Branch, B.M.A.: Clinical Meeting.
MAY 12.—Queensland Branch, B.M.A.: Council.
MAY 12.—South Australian Branch, B.M.A.: Council.
MAY 15.—Illawarra Suburbs Medical Association, New South Wales.
MAY 16.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
MAY 17.—Western Australian Branch, B.M.A.: Branch.
MAY 23.—New South Wales Branch, B.M.A.: Medical Politics Committee; Organization and Science Committee.
MAY 24.—Victorian Branch, B.M.A.: Council.
MAY 25.—South Australian Branch, B.M.A.: Branch.
MAY 25.—Brisbane Hospital for Sick Children: Clinical Meeting.
MAY 26.—New South Wales Branch, B.M.A.: Branch.
MAY 26.—Queensland Branch, B.M.A.: Council.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned.

Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, B.M.A. Building, 30-34, Elizabeth Street, Sydney. (Telephone: B. 4635.)